THE AGRICULTURAL GAZETTE OF CANADA

STORAGE

Vol. IX July-August, 1922 No. 4

LEADING TOPICS

The Brandon Experimental Farm
Cow Testing, 1921
Canadian Seed Legislation
Illustration Community Work
Agricultural Instruction in New Brunswick
Rural Life and Activities for Women
School Gardens and Home Gardens
Rural Credits in Canada

LIBRARY UNIVERSITY OF TORONTO

DEPARTMENT OF AGRICULTURE
OTTAWA, CANADA

The Agricultural Gazette of Canada is published bi-monthly, in English and in French, by the Dominion Department of Agriculture, Ottawa.

The aim of The Agricultural Gazette is to provide a source of information as to the policies and activities of the Dominion Department of Agriculture and of the Provincial Departments of Agriculture and of Education, so far as the work of the latter relates to Agricultural Education. Besides being a publicity medium, it constitutes a comprehensive record of the progress and development of departmental effort on behalf of Agriculture in Canada.

The Agricultural Gazette is not intended for general distribution. It it sent free to agricultural workers and teachers, including school teachers who have agricultural teaching qualifications; to members of parliament; to libraries; to the Press, and, as an exchange, to institutions in other parts of the Empire and in foreign countries.

A limited number of copies are available to subscribers at $1.00 per annum, or 20 cents per copy.

Subscriptions should be addressed to the Editor.

DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE
PUBLICATIONS BRANCH

Vol. 9: No. 4 July-August, 1922

The AGRICULTURAL GAZETTE
OF CANADA

J. B. SPENCER, Director of Publicity
Wm. B. VARLEY, Editor

Issued by authority of the Honourable W. R. Motherwell, Minister of Agriculture
OTTAWA

OTTAWA
F. A. ACLAND
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1922

42292—1

MAP OF CANADA SHOWING THE LOCATION OF FARMS, STATIONS AND SUB-STATIONS IN THE EXPERIMENTAL FARMS SYSTEM, THE AGRICULTURAL COLLEGES AND AGRICULTURAL SCHOOLS

CONTENTS

PART I.

DOMINION DEPARTMENT OF AGRICULTURE

PAGE

THE DOMINION EXPERIMENTAL FARM SERIES,—THE BRANDON EXPERIMENTAL FARM, *by W. C. McKillican*... 275
REPORT OF COW TESTING, 1921, *by A. H. White*... 279
ILLUSTRATION COMMUNITY WORK IN DUNDAS COUNTY, ONTARIO, *by F. C. Nunnick, B.S.A*... 283
THE APPLICATION OF SEED LEGISLATION IN CANADA, *by C. Sweet*... 295
SEED PRODUCTION IN ALBERTA, *by G. M. Stewart*... 298

PART II.

PROVINCIAL DEPARTMENT OF AGRICULTURE

NEW BRUNSWICK'S ACTIVITIES UNDER THE AGRICULTURAL INSTRUCTION ACT, *by O. C. Hicks, B.S.A*... 301
THE MANITOBA AGRICULTURAL SURVEY... 305
AGRICULTURAL LEGISLATION, 1922—NEW BRUNSWICK, SASKATCHEWAN, ALBERTA, MANITOBA... 307
THREE MONTH COURSES IN AGRICULTURE AND DOMESTIC SCIENCE... 314

PART III.

AGRICULTURAL EDUCATION AND RELATED ACTIVITIES

RURAL LIFE AND ACTIVITIES FOR WOMEN, *by Miss Abbie Delury*... 315
SCHOOL GARDENS AND HOME GARDENS, *by G. V. Van Tausk, M.A., B.Sc. (Oxon) B.S.A*... 318
THE SCHOOL GARDEN, WHERE? *by Fred W. Bates, B.A., M.Sc*... 320

PART IV.

SPECIAL CONTRIBUTIONS, REPORTS OF AGRICULTURAL ORGANIZATIONS, PUBLICATIONS AND NOTES

RURAL CREDITS IN CANADA... 321
PROTECT THE BIRDS, *by L. Stevenson, B.S.A*... 324
BEES MAY NO LONGER BE IMPORTED FROM EUROPE... 326
EXPORT FEE FOR FOXES... 326
NEWS ITEMS AND NOTES... 326
APPOINTMENTS AND STAFF CHANGES... 331
NEW PUBLICATIONS... 332
ASSOCIATIONS AND SOCIETIES... 333
THE LIBRARY... 334

PART V.

THE INTERNATIONAL INSTITUTE OF AGRICULTURE

FOREIGN AGRICULTURAL INTELLIGENCE—
- Science and Practice of Agriculture... 337
- General Information... 337
- Crops and Cultivation... 337
- Live Stock and Breeding... 341
- Farm Engineering... 344
- Rural Economics... 346
- Agricultural Industries... 347
- Plant Diseases... 348
- Other Articles on Science and Practice of Agriculture... 350

THE INTERNATIONAL REVIEW OF AGRICULTURAL ECONOMICS... 352
AGRICULTURAL STATISTICS... 353

Digitized by the Internet Archive
in 2007 with funding from
Microsoft Corporation

http://www.archive.org/details/n04agriculturalg09canauoft

The AGRICULTURAL GAZETTE
OF CANADA

VOL. IX JULY-AUGUST, 1922 No. 4

DOMINION EXPERIMENTAL FARM SERIES

THE BRANDON EXPERIMENTAL FARM

BY W. C. McKILLICAN, SUPERINTENDENT

THE Experimental Farm for Manitoba was established at Brandon in the year 1888. It is therefore one of the pioneer farms of the Dominion Experimental Farm system. The first Superintendent was Mr. (now Dr. S. A. Bedford, who far many years carried on a work of inestimable value to the province. In the first years of the Farm's history its activities were directed toward solving the problems of the pioneer stage of agriculture. Tests were made of almost innumerable varieties of grain, many of which were brought from distant countries. Trees and flowering shrubs were brought from countries having a severe climate in order to provide the prairie with hardy material. The caragana is an example of one of the most important plant importations. Pioneer work was accomplished in regard to ascertaining the best methods of handling the prairie soil in order to get satisfactory returns, while work with fodder crops, vegetables and live stock began early in the history of the Farm to take an important place.

As conditions have changed with ageing and development of the country, so the work on the Experimental Farm has been modified and enlarged. Manitoba to-day is in a transition stage. The system of grain growing which proved so successful in the early stages of her agricultural history is breaking down. The constant drain upon the soil, and the continual pulverization due to cultivation with no return of fertility or vegetable fibre, has rendered imperative the need of a changed system. Soil drifting, lessened yields, weeds, insects, and plant diseases have all appeared as symptoms of the soil disease that follows the one-crop system. The chief object of the Brandon Experimental Farm at the present time is to provide the information and leadership that will enable the farmer to pass this trying period of change and to bring into existence in Manitoba a system of diversified farming which will put agriculture on a new plane of permanence and prosperity.

Crop Rotation Experiments

One of the features of the work of this Farm that bears most directly on this problem, is the experiment with crop rotations. This experiment makes a direct comparison between the grain growing system and various arrangements of crop sequence into which fodder crops are introduced. The comparisons are conducted on field areas as distinct from small plots, so that natural farm conditions are obtained. The areas used also permit of cost and return records. All items of cost in the production of crops on these rotation fields are accurately kept, and all crop returns are equally as carefully recorded and their values computed as fairly as possible. These records give definite profit-and-loss comparisons of the rotations under test. Data are also being established in regard to the effect

on the land of these rotations. Check plots representing the rotations were started on virgin soil, which soil was analyzed at the beginning of the experiment in 1911, and the analysis will be repeated from time to time to determine the effect the rotation has on its fertility. The rotations under test include straight grain growing with a summer fallow once in four years; the same sequence of crops with the application of barnyard manure; the addition of a mixed grass and clover hay crop to the grain system; the substitution of corn for fallow; the use of alfalfa as a main feature of a rotation, and different arrangements of the order of the crops concerned. Important results have already been obtained from this experiment, indicating that greater profit can be made from a mixed farming system aside altogether from the lasting effect on the soil, and showing the great value in rotations of such crops as corn, alfalfa and grasses.

As a by-product from the rotation experiment come very valuable data on the cost of production of the various farm crops. These are reported on from year to year and give authentic figures on the cost of the different crops produced in different ways.

Experiments with Fodder Crops

The experimental work with fodder crops is another important contribution to the solving of Manitoba's agricultural problem. Any mixed farming system likely to be a success includes something of this kind. Experiments have been carried on to determine what crops are best suited to the climate and how best to grow them. Great success with alfalfa has been attained at Brandon. Trials with different strains and varieties have been made to ascertain which are hardiest and most productive, and many tests are being conducted to determine the best methods to follow in preparing the land and growing the crop. Similar work is being carried on with sweet clover, and to a lesser extent with Western rye grass. Cultural experiments with corn have been conducted for a number of years and are

The breeding of Clydesdale horses is one of the features of the Brandon Experimental Farm.

now being undertaken with sunflowers. Tests of varieties of each are included.

Variety Tests

While forage crops are getting special attention at the present time owing to their peculiar importance and the general demand for information from beginners with this type of crop, the cereal crops are by no means being neglected. The Brandon Farm has always been one of the principal testing-out stations for the new varieties originated by Dr. C. E. Saunders, the Dominion Cerealist. There are always a number of these on trial, as well as of any promising or "boomed" new kinds from other sources. An effort is made to furnish the farmers of Manitoba at as early a date as possible with reliable information as to how any new kind of grain compares with the standard sorts in general use. Cultural experiments dealing with methods of wheat growing and the production of other cereals occupy a very important place in the farm work and fill a large part of the annual report.

Live Stock

One of the outstanding developments of the Brandon Farm has been the growth of the work with live stock. This is of course in keeping with the general policy of the development of mixed farming. The work in the breeding of dual-purpose Shorthorn cattle has brought the Farm some prominence in live stock circles. The small herd established at Ottawa was transferred to Brandon in 1911, and has since been developed by the use of good sires and by the selection of the females. The herd has now become one of the best of its kind in Canada in uniformity of type and in good beef quality combined with a reasonably good ability to produce milk. Two cows with records of over 12,000 pounds in a year have been raised, and many of the others have records ranging from 7,000 to 11,000 pounds in a year.

Breeding work with Oxford Down sheep, Yorkshire swine and Clydesdale horses also occupies an important place in the Farm operations, and a good representative group of each is maintained.

Brandon Experimental Farm.—Plantation of small fruits sheltered by hedges of Caragana.

Feeding Experiments

Experimental feeding work has occupied a very important place in the work of the Farm. Perhaps the outstanding effort has been the work in winter steer feeding. Ever since 1892 this phase of experimentation has been kept to the front. In 1907, Mr. Jas. Murray, then Superintendent, began the experiment in outdoor steer feeding which proved the possibility of successfully feeding cattle without warm stables in this climate. This has been of great value in starting winter steer feeding where it would otherwise have been considered impossible. Extensive comparisons of cattle feeds have been made in feeding trials, and much information has been compiled therefrom. The most recent feature of this work is the testing out of sunflower silage as a cattle food, which experiment is described in the last report.

Similar feeding trials have been made with sheep and hogs and also to a lesser degree with horses. Experiments in the housing of these kinds of stock have also been made, the experiment in regard to hogs being considered especially valuable.

Poultry Department

During the last few years a strong poultry department has been developed. The White Wyandotte and Barred Plymouth Rock breeds of fowl are kept. The breeding work is conducted for the purpose of developing utility strains, which will lay such numbers of eggs and be of such a type of conformation as to be profitable fowl for the Manitoba farmer to keep. Trapnesting and selective breeding are conducted with this object in view. Experiments in housing, feeding and managing poultry are carried on. The Manitoba Egg-laying Contest is located at the Brandon Farm.

Driveway planting.—Trees and flowering shrubs suited to the Manitoba climate are grown in great variety at the Brandon Experimental Farm.

Horticulture

While the money making features of Manitoba farming are securing the largest amount of attention, the beautification, sheltering and victualling of the farm home are also kept well to the

fore. The horticultural department is one of the strong features of this Farm. Perhaps vegetable crops receive most attention. Vegetables do exceptionally well in this climate, and tests of varieties and of methods, which are conducted in wide range, are followed with keen interest by folk from country and town alike. Great interest has followed the work in tomato growing in particular.

The testing out of hardy kinds of fruits suitable to the prairie climate continues to be an important feature of the work. Considerable success has been attained with plums and bush fruits. Apples, though the subject of much laborious effort, have not as yet shown great success, only small crabapples having proved really hardy.

The hedges, shelter belts and ornamental grounds on the Brandon Farm are a constant source of delight to visitors, and a demonstration of what can be done in tree, shrub and flower growing in the prairie country. They and the fruits and tender vegetables that grow in their shelter are a proof of the importance of providing shelter for the home garden. The collection of trees and shrubs grown on the grounds shows a wide range of varieties that are hardy and suitable and the display of flowers each year is a source of information and inspiration as to what can be done in regard to home beautification in Manitoba.

The Brandon Farm is operated with the intention of assisting the Manitoba farmer in the development of all phases of his farming. No one department is specialized in to the extent of crowding out other lines of work, but an effort is made to serve all equally well, and to preserve a just balance between the different fields of activity.

REPORT OF COW TESTING, 1921

A. H. WHITE, CHIEF DAIRY PROMOTER

DURING the year 1921, the cow testing work of the Dominion Dairy Branch has been carried on under the same general policy which was adopted in 1918. The farmers supply the necessary equipment to weigh the milk and keep samples for three days during each month. The Dairy Branch, through the Dairy Promoter of each province, organizes and supervises the testing centres and compiles the records received at the office in Ottawa.

Under this plan, there has been a substantial increase in the number of herds and cows under test and also in the total number of Babcock tests made. This increase has been due, largely, to the splendid efforts of the Quebec Dairy Inspectors in the cow testing campaigns put on during the month of March in the years, 1920 and 1921, and which were authorized by the Dairy Branch of the Quebec Department of Agriculture. In Ontario, the work nearly doubled during the past year and this is due to the assistance and co-operation of the provincial Dairy Instructors and the District Representatives.

No doubt, these campaigns have brought cow testing to the attention of many individual farmers and during the past year, numerous requests have been received for milk record forms. Hundreds of daily milk record forms have been sent out as a result of these requests.

Provinces Take Over Work

The past year saw some changes in the supervision of the work in Saskatchewan and Manitoba. On May 1st, the Saskatchewan Dairy Branch took over full control of the cow testing work in that province. In Manitoba, the Provincial Dairy Branch has complete charge of the field work in organizing and supervising the testing centres while the Dominion Dairy Branch has

compiled the records and paid for the testing.

Individual Feed Records

It is fully recognized that along with the milk record should go the feed record for each cow. This question of better feeding is very important and is being brought to the attention of the farmers continually. It takes some extra time and care to keep a feed record but quite a number of farmers have seen its value and have kept such a record during the year 1921. The Dairy Branch has supplied feed record forms, free of charge, to all dairymen who wished to keep a record of the feed consumed by each individual cow.

A report on cow testing work must, necessarily, contain many figures and the following figures have been arranged in concise, tabular form to show the extent of the work during 1921 and also some of the benefits and results accruing to different districts and to individual farmers.

TABLE I—Total Number of Herds, Cows, Testing Centres and Tests Made, by Provinces, 1921

Province	No. Herds	No. Cows	Number of Testing Centres	Number of Samples tested
Alberta	65	793	27	3,924
British Columbia	40	163	5	691
Manitoba	176	1,173	34	2,858
New Brunswick	111	822	14	3,553
Nova Scotia	338	2,119	46	9,685
Ontario	767	9,373	93	39,557
Prince Edward Island	198	1,227	19	7,017
Quebec	3,499	32,225	473	127,462
Totals	5,194	47,895	711	194,747

The figures for Saskatchewan have not been given in the foregoing table as the work was carried on by the Provincial Dairy Branch. The figures for British Columbia do not represent the full extent of the work in that province. These figures are for only a few herds in districts where there is no organized co-operative cow testing association. There were at least six co-operative associations operating in British Columbia during the past year with an average membership of twenty-five or twenty-six farmers with from 400 to 500 cows under test.

TABLE II—Comparison of the Number of Herds, Cows, Testing Centres and Total Tests made in 1919, 192 and 1921

Year	No. Herds	No. Cows	No. of Testing Centres	Total No. of Tests	Average No. of Tests per cow
1919	2,416	22,517	348	94,585	4·20
1920	3,847	33,382	564	139,418	4·17
*1921	5,194	47,895	711	194,747	4·07
Increase, 1919 to 1921	2,778	25,378	363	100,162	

*Saskatchewan figures for 1921 not included. Increase is really more than shown.

These figures show conclusively the progress of the cow testing movement in Canada. It will be seen that the number of herds and cows under test in 1921 is more than one hundred per cent greater than the number under test in 1919. The largest increase has again taken place in Quebec but the percentage increase in Ontario is higher, being nearly one hundred per cent. These figures, of course, do not show the total number of herds and cows being tested

throughout the different provinces. There are many farmers who are testing and do not send in reports to the Dairy Branch at Ottawa, but who, in a great many cases, receive record forms to help them in this work.

TABLE III—Number of Herds and Cows Recorded for Eight Months or over and the Average Production by Provinces, 1921

Province	No. Herds	No. Cows	Average Production		
			Milk	Test	Fat
			Lb.		Lb.
Alberta	18	230	7,048	3·26	229·6
British Columbia	14	47	6,932	3·98	276·5
Manitoba	4	37	7,317	3·13	228·9
New Brunswick	31	184	5,024	3·98	200·4
Nova Scotia	109	535	5,283	4·10	216·8
Ontario	94	963	7,136	3·44	245·8
Prince Edward Island	67	318	6·569	3·68	242·1
Quebec	221	1,948	4,946	3·88	192·3
Saskatchewan	22	186	6,861	3·32	227·8
Totals and Averages	580	4,448	5,801	3·69	214·1

A comparison of the number of herds and cows in Tables I and III will show the comparatively small number of herds and cows tested for the full milking period. This is a difficulty hard to overcome when so many centres have the testing done at local cheese factories which operate for only a few months during the flush season. There are many herds tested for only five, six or seven months which, had they been tested longer and the records used in compiling an average production per cow, would tend to increase rather than decrease the figures given in Table III.

TABLE IV—Average Production by Provinces for Years 1915, 1919 and 1921

Province	Average Production 1915		Average Production 1919		Average Production 1921	
	Milk	Fat	Milk	Fat	Milk	Fat
	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.
Alberta			5,198	190·7	7,048	229·6
British Columbia			6,669	262·8	6,932	276·5
Manitoba			5,177	183·4	7,317	228·9
New Brunswick	4,558	183·3	5,857	235·6	5,024	200·4
Nova Scotia	4,909	200·7	4,962	195·5	5,283	216·8
Ontario	6,294	217·4	6,725	243·0	7,136	245·8
Prince Edward Island	5,235	198·8	6,586	243·4	6,569	242·1
Quebec	4,472	172·9	4,798	182·8	4,946	192·3
Saskatchewan	4,392	169·2	4,944	192·9	6,861	227·8
General Average	5,285	195·5	5,522	207·9	5,801	214·1

The above figures show the progressive increases in milk and fat production which inevitably follow consistent and intelligent cow testing. The increases are small from year to year but this is due to the large number of new herds and cows recorded each year. Less than half of the herds recorded in 1920 were recorded for full periods in 1921. The inclusion of so many records of new herds and cows tends to keep down the average production per cow.

Increased production per cow in testing centres and in individual herds is very much higher as the following figures indicate.

TABLE V—Increases in Production at Testing Centres in Ontario

Centre	No. of Cows	Average Production 1919		No. of Cows	Average Production 1921	
		Milk	Fat		Milk	Fat
		Lb.	Lb.		Lb.	Lb.
Southwold Station	14	7,828	272·0	14	9,315	322·0
Woodstock	37	8,046	265·3	56	8,629	289·2
Colborne	61	8,622	302·4	53	9,413	335·6
Atwood	28	8,736	283·1	25	9,352	288·2

The improvement in the average production per cow at these four centres in Ontario is exemplary of what is taking place at all the centres where records are kept for a few consecutive years. The figures for centres in all the provinces show similar increases.

TABLE VI—Increases in Production of Individual Herds

Herd No.	No. Cows	Average Production 1919		No. Cows	Average Production 1921	
		Milk	Fat		Milk	Fat
		Lb.	Lb.		Lb.	Lb.
1	7	7,742	248·8	8	10,402	324·6
2	20	8,421	277·1	21	10,017	337·2
3	12	8,559	272·8	14	11,912	379·8
4	10	9,696	358·4	15	10,080	371·3
5	13	9,787	301·9	13	10,686	328·0
6	2	6,432	218·0	11	8,464	287·5
7	12	5,017	181·9	18	5,644	213·8

It will be noticed that the average production per cow in all these herds is much above the estimated production of the average dairy cow in Canada. Yet, in two years' time, these farmers, by weeding out poor producers, using better feeding methods and keeping better sires, have been able to make a substantial increase in production even when the production to begin with was over 9,000 pounds of milk.

There were many strong associations and centres operating during the past year in all the provinces. One of the good associations organized was at Copetown, Ontario, where some 28 herds and 317 cows were tested. Nineteen herds with 218 cows finished the full year with an average of 7,340 pounds of milk and 247·5 pounds of fat. The largest centre was in the locality of Metabetchouan, P.Q. In this district, 94 herds with 1,385 cows were tested for some part of the year. Some 49 herds and 616 cows were tested for eight months or longer and the average production was 5,207 pounds of milk and 205·7 pounds of fat.

Notwithstanding the large increase in the number of herds and cows under test in 1921, there are many dairying districts which could improve the average production per cow by organizing a cow testing association which would have as its aim the betterment of the dairy stock in that locality.

NUMBER OF HERDS, COWS AND TESTS BY PROVINCES, 1919, 1920 AND 1921

Province	1919			1920			1921		
	Herds	Cows	Tests	Herds	Cows	Tests	Herds	Cows	Tests
Alberta	64	820	2,539	38	515	3,124	65	793	3,924
British Columbia	34	215	1,235	24	102	610	40	163	691
Manitoba	83	1,035	3,793	78	580	2,214	176	1,173	2,858
New Brunswick	250	1,065	5,144	180	1,177	4,245	111	822	3,553
Nova Scotia	207	2,714	12,623	372	2,224	11,876	338	2,119	9,685
Ontario	417	4,214	18,204	446	4,911	20,835	767	9,373	39,557
Prince Edward Island	241	1,307	5,907	164	976	5,765	198	1,227	7,017
Quebec	1,046	10,374	42,428	2,474	22,229	87,594	3,499	32,225	127,462
Saskatchewan	74	773	2,912	71	668	3,155	.....	.....	.....
Totals	2,416	22,517	94,584	3,847	33,382	139,418	5,194	47,895	194,747

Saskatchewan figures not included for 1921, Provincial Government took over the work.

ILLUSTRATION COMMUNITY WORK IN DUNDAS COUNTY, ONTARIO

BY F. C. NUNNICK, B.S.A., CHIEF, DIVISION OF EXTENSION AND PUBLICITY, DOMINION EXPERIMENTAL FARMS BRANCH

THE illustration work in Dundas county had its inception under the Commission of Conservation. Dr. Jas. W. Robertson, Chairman of the Committee on Lands of the Commission, was primarily responsible for the plan of this work, which remained under the Commission until the last year of the five-year period, when, upon the repeal of the Act constituting the Commission, it was transferred to the Experimental Farms Branch of the Dominion Department of Agriculture. Throughout the whole period, Mr. F. C. Nunnick, Agricultural Advisor of the Commission of Conservation, and now Chief of the Division of Extension and Publicity of the Experimental Farms Branch, was in supervision of the work.

First Survey and Illustration Farms

During the spring and summer of 1912, the Committee on Lands of the Commission of Conservation selected a number of Illustration Farms in each of the provinces of the Dominion. These were, in most instances, chosen from among the farms that had been previously visited in connection with an agricultural survey conducted by the Commission during 1910 and 1911. This survey had been conducted on groups of contiguous farms numbering from 30 to 50 farms in each group. There were 35 of these Illustration Farms chosen in all. The Commission, through its Committee on Lands, planned and supervised the illustration work conducted on these farms during the years 1913 and 1914. In 1915 they were taken over by the Dominion Department of Agriculture, and through the Division of Illustration Stations of the Dominion Experimental Farms System, the supervision of the work was continued during 1915. This concluded the three-year period previously arranged for by the Commission.

Illustration County Suggested

At the annual meeting of the Commission of Conservation in 1916, after having reviewed the results of Illustration Farm work previously conducted, Dr. Robertson, Chairman of the Committee, said:—

"I now hope for, and desire, an Illustration County, after the plan of our Illustration Farms. In it, there

could be tried out and put to the proof, the theories and concepts of the best things that have been found useful there, or elsewhere. We need such a district where all the several activities of all these various agencies could be seen properly co-ordinated and at their best. The first step would be to conduct a thorough survey of a district, a county for example. For that, the hearty co-operation of provincial authorities and municipal authorities would be sought. The Commission of Conservation is an appropriate and competent agency through which the survey could be conducted. The survey would deal with such questions as (1) farm labour, (2) co-operation, (3) roads and transportation, (4) education, and (5) opportunities for recreation and the development of a richer social life. In every one of these matters the problem has been solved, at least for the present, in some instance or some district. Let us suppose that the Commission discovers that a plan or method has been found adequate and effective in some rural community. Can the same or another method be enlarged and developed into a system suitable for many cases or several communities? Can the same, or other methods, be organized and applied to serve a whole country?"

Agricultural Survey Conducted

In pursuance of the plans of the Lands Committee regarding a thorough survey of a district, 400 farms in Dundas county, Ontario, were visited by a representative of the Commission during the summer of 1916. These farms were chosen in groups of 25 contiguous farms, there being 16 such groups, i.e., four groups in each of the four townships in the county. This general survey yielded much information, which served as a guide in planning and commencing the Illustration County work, as many phases of farm operations and farm life were included in its scope, among them being the following:—

1. System and methods of farming, such as planning, rotation of crops, seed selection, cultivation, live stock, use of manure, etc.
2. Farm labour, machinery and equipment.
3. Business methods, in selling, buying, co-operation, etc.
4. Public service, such as railways, roads, telephone, rural free delivery, etc.
5. Educational work through schools, school gardens, home gardens, boys' and girls' clubs, school fairs, etc.
6. The promotion of intellectual, social, moral and ethical progress.

In one county co-operation among farmers is more general than in other counties; in another there are better roads; in another social life is more pleasant; in another there are better farming methods; in still others some one phase of farm life or practice is further developed. In no one county are all of these things at their best. With a view to effecting improvement along all of these lines in harmonious relation, the county of Dundas was chosen in the spring of 1917, as an Illustration County. After Dundas county was chosen, the co-operation of the Provincial and Dominion Departments of Agriculture, and the people themselves, was sought in an endeavour to assist in the improvement of those things that pertain to the agricultural and general welfare of the county.

Illustration County Chosen

In connection with the improvement of general farming methods, arrangements were made with 16 farmers in the county, who became known as Illustration Farmers, to put into practice on their farms certain definite lines of work which would serve as object lessons for the various districts. In gen-

eral, the scheme of co-operation between the Commission and the farmers included in its consideration the following matters:—

The planning, commencing and carrying on of a suitable systematic rotation of crops for each farm and its neighbourhood.

The sowing of the varieties and strains of grain suitable to the farm and the district.

Different rates per acre to ascertain the most suitable rate of seeding.

The sowing of different amounts per acre of clover and grass seed, to ascertain the most suitable rate of seeding of both home-grown and purchased seed.

The sowing of various summer pasture mixtures.

The practising of after harvest cultivation, extra and more thorough cultivation to kill weeds, conserve moisture and increase yields.

The introduction of labour-saving devices and up-to-date machinery.

The care and economical use of farm yard manure.

The encouragement of a farm garden.

Directly and indirectly encouraging many other means to make the farm more profitable, the farm life more satisfactory and pleasant, and to help to keep the young people on the farms.

The sixteen farmers chosen were: Thos. Johnston, Glen Stewart; Samuel Smyth, Dundela; Orrin Strader, Brinston; Andrew Fawcett, Inkerman; M. J. Loughlin, North Mountain; Wm. McIntyre, Mountain; R. K. Graham, South Mountain; Chas. F. Marcellus, Dunbar; Arthur Nash, Morrisburg; Durham Wells, Hoasic; Whitteker Bros., Williamsburg; W. H. Casselman, Chesterville; Arthur Christie, Winchester; F. Frank Davidson, Winchester; G. C. York, Morewood; R. Ellis, Iroquois, who sold his farm in 1919, but the work was continued by Errington and Driscoll, to whom the farm was sold.

Plan of the Work

The illustration farmers were chosen after conference with the Agricultural Representative of the county, who had been in the county for a number of years and knew the county and the farmers intimately. The farmers, thus chosen, received no salaries, nor did they become the beneficiaries of the public through political patronage, but were chosen because of their ability as leaders and their willingness to co-operate in this work. They retained the full ownership and full control of their farms. At the same time, they received counsel as to systems of rotation, methods of cultivation, the selection of seed, etc.; but the general administration of the business affairs of the farms was directed entirely by the illustration farmers themselves. They were asked to put into operation those things which, after conference with the Agricultural Advisor, they considered would be profitable to them. The agricultural survey had revealed the fact that there was much room for improvement of the methods being followed on farms in the county of Dundas.

Materials Supplied

Each illustration farmer was supplied the first year with approximately the following amount of pure seeds.

Seed for two acres, registered Banner oats;

Seed for two acres, mixed oats and barley, Ligowo or Daubeny oats and O. A. C. No. 21 barley;

Red Clover, ten pounds northern-grown seed and five pounds per acre extra for up to 10 acres of crops seeded to make the seeding at least 10 pounds per acre;

Summer pasture, two acres, (various mixtures);

Corn, one-half bushel each of four suitable varieties;

Vegetable garden collection;

Formalin for treating seed oats for one field, where the farmer would agree to treat the seed;

Potatoes, one bag Green Mountain, one bag Irish Cobbler, of New Brunswick grown seed.

Work has also been conducted on these farms during the five-year term with lime, fertilizers for corn, potatoes, oats and orchard, alfalfa and sweet clover seeding, buckwheat for smother crops, etc. From the above it will be seen that the expense in the way of supplying material has been very small, and, it should be added, the amount supplied after the first year was considerably reduced.

During the five years the Agricultural Advisor visited each of these 16 farmers every three or four weeks from early spring to late autumn for the purpose of conference and to inspect the results of the various lines of work undertaken.

Results of First Year's Work

The following brief extracts from some of the letters received from the illustration farmers in the county, who conducted this practical work on their farms, will indicate some of the results of the work of the first year, viz., 1917.

Orrin Strader, Brinston, Ont.—"I sowed 10 pounds of clover seed to the acre on five acres, and three pounds per acre on the balance of the field. The results are 50 per cent better on the part sown 10 pounds to the acre, and I think it will stand the winter much better as it has made a shelter for itself. Judging from this result, I am of the opinion that 10 pounds to the acre should be sown at all times.

"The Banner oats, which were sown two and one half bushels to the acre, have proved a splendid variety. I cannot tell how much per acre they will yield, as we have not threshed them yet, but I am well pleased with the crop.

"The Green Mountain potatoes yielded 22 bushels from 90 pounds planted, and the Irish Cobbler only 9½ bushels from the same quantity of seed. They were planted side by side. The Green Mountains were more suitable on our soil this year."

Durham Wells, Williamsburg, Ont.—"Both in straw and grain the Banner oats supplied by the Commission of Conservation gave a much heavier yield than my own oats. The mixed grain grown from your seed produced plumper grain, but about the same quantity of straw as that grown from my own seed. I am much interested in the seeding down of this field. I sowed the seed as directed by you, one acre with ten pounds of northern-grown clover seed and eight pounds of grass seed; one acre with ten pounds of clover seed grown by myself and eight pounds of grass seed; one acre with ten pounds McDonald's clover seed and eight pounds of grass seed; one acre with thin seeding, i.e., with eight pounds of a mixture of clover and grass seed, which is my usual seeding.

"This autumn the thin seeding has a much thinner stand than the thick seeding. It will be interesting to see how this field comes out next summer.

"In another five-acre field I sowed one acre with one bushel of vetches and two bushels of oats; one acre with one bushel of peas and two bushels of oats and three acres with wheat, oats and barley. Now this field was sowed to save five acres of meadow for hay that would otherwise have been pastured. The growth was very rank, as you remember, so we pastured only one-half of the field, fencing off half, and cutting it for feed for winter. This two and one-half acres furnished my main pasture for the months of July and the best part of August, increasing the yield of milk from my 12 cows by 35 pounds per day, and maintaining it a month or more when old pastures were very short. I saved by summer pasture ten tons of hay, two loads of vetches, six bushels of oats, one load of peas and oats and three loads of wheat, oats and barley. In addition, I seeded the field down for meadow or pasture for next year.

"The potato seed you supplied gave more than double the yield of my own seed, 90 pounds of Green Mountain yielding over 25 bushels, and the same weight of Irish Cobblers, 20 bushels.

"My vegetable garden was prized very highly, giving abundance of vegetables of the very best quality."

R. K. Graham, South Mountain, Ont. —"The Irish Cobbler potatoes gave a yield of 22 bushels and 40 pounds per bag; the Green Mountains, 19 bushels and 17 pounds, each outyielding our own variety, the American Wonder."

Thomas Johnston, Brinston, Ont.— "The results of my illustration work have been very satisfactory. They are as follows:—

"Clover.—5 pounds to the acre and 10 pounds to the acre were sown side by side, under the same conditions. There is a very marked difference in favour of the 10 pound seeding.

"Oats.—The Banner oats turned out well, yielding, I would judge, between 75 and 80 bushels from the three bushels of seed received from the Commission. This variety seems to be adapted to this soil.

"Peas.—Turned out splendidly.

"Corn.—Wisconsin No. 7 and Bailey turned out well, the latter being the better.

"Potatoes.—Green Mountain were of large size and turned out well, yielding about 18 bushels from one and one-half bushels of seed. Irish Cobblers yielded about 22 bushels. The yield would have been much larger if the potatoes had been properly cared for; owing to shortage of help they were neglected. The Irish Cobblers appear to give the best results in this soil."

Samuel Smyth, Iroquois, Ont.— "Our oats had no smut, as they were well treated, but there was a little on the barley, which was not treated so carefully. We used O.A.C. 21 barley mixed with Ligowo oats. This makes a good early crop for harvesting before the oat crop.

"One and a half bushels each of Green Mountain and Irish Cobbler potatoes yielded 17 bushels and 27 bushels respectively. We sprayed them for blight, thus making the tops stay green longer.

M. Joseph Loughlin, Mountain, Ont. —"There were some splendid results, especially in potatoes and corn, from the seed you supplied.

"I had three kinds of potatoes, Green Mountain, Irish Cobbler, and my own American Wonder, planted in the same field. The yield of Green Mountains was 100 per cent better, and that of the Irish Cobblers about 25 per cent better than the yield from American Wonder.

"The Wisconsin No. 7 corn bore more ears than any of the other three kinds—Leaming, White Cap Yellow Dent, and Golden Glow.

"A seeding of 10 pounds of clover to the acre shows superior results to a 5-pound seeding, but there is no marked difference between the northern and home-grown seed.

"We sowed spring rye, peas and oats for summer feed. It grew splendidly and made excellent feed."

F. Frank Davidson, Winchester, Ont. —"I will try to give you as best I can an account of the work conducted on our farm this year. In every case it proved profitable.

"The Banner oats looked very nice in the field and yielded more per acre than our own oats sown in the same field.

"The O.A.C. No. 21 barley gave good results, but the Ligowo oats sown with it were a little thin. The seed was all treated and there was very little smut.

"The Early Bailey corn sown in drills, gave a heavy crop of stalks and was well eared. It is earlier than Wisconsin No. 7 and Leaming, which were sown in the same field.

"One bag of Irish Cobbler potatoes yielded 14 bags of nice potatoes with no rotten ones, while one bag of Green Mountains yielded 16 bags with only four rotten ones.

"I am very much pleased with the results of the clover crop. The northern-grown seed looks fine, while the home-grown is not far behind it. This was sown at the rate of 10 pounds per acre. Seeding at 10 pounds per acre looks much better than that sown at six or

seven pounds. I am much in favour of thick sowing."

Arthur Christie, Winchester, Ont.— "During the early part of July, six acres of sod that had been pastured off short, and which was badly infested with twitch grass, was ploughed, and the sod rolled down with a roller weighted with stones. Two acres were sown to buckwheat. Unfortunately, when the buckwheat was about an inch high a hail storm pounded out half of it. However, the balance came on very rapidly and we harvested about 80 bushels of good grain from the two acres and, while ploughing this fall, I noticed very little twitch grass. Two acres were sown to rape, in drills 30 inches apart, and cultivated three times. This rape not only produced a lot of feed for our cows, but also dealt a death blow to the twitch grass. The remaining two acres were summer fallowed and worked with both the disc and broad shear cultivator at short intervals during the summer. We are now ploughing the whole field. We will give it a good coat of manure this winter, work it up well in the spring and plant corn in squares.

"The stubble land which was not seeded to clover was ploughed after harvest, cultivated at different times as required, and again ploughed this fall. The oats and vetches which we sowed for green feed proved an 'eye-opener' to me and solved the question of summer feed for dairy cows; of course they give best results when fed in conjunction with ensilage. Our fall ploughing is well advanced and we are looking forward to and planning for a still bigger crop next year."

Second Crop Clover for Seed on the Farm of A. E. Nash, Morrisburg, Ont.

The above extracts from letters received from the farmers themselves, referring to their work during the first year, indicate clearly the interest taken by them in the work. They also illustrate the nature and simplicity of the work attempted. As each year's work was planned, new features were arranged for. Many of these farmers were making suggestions after the first year and were anxious to try other things, not new-fangled or risky things, but other improved methods that had

been put to the test on the Experimental Farms. After the first year's work these farmers desired to try several varieties of oats, corn, etc., to see which variety was best suited to their soil and conditions.

Varieties Grown

The varieties of oats that have been used during the five years are Banner, Victory, Gold Rain and Twentieth Century. Daubeny oats have been used in mixed crops of oats and No. 21 barley. A number of varieties of silage corn have been tried. Those proving the most popular among the dents being Wisconsin No. 7, Golden Glow, White Cap Yellow Dent, Bailey, and Improved Leaming. Some flint varieties were tried, such as Longfellow, Salzer's North Dakota White Flint, and Quebec Yellow No. 28. The dents and flints have been grown separately and in mixture.

In the case of potatoes it was found that practically all of the 16 farmers chosen were planting "just potatoes". Those who gave a name to what they were planting stated that their seed was badly mixed. Irish Cobbler, Green Mountain, and Dooley were the varieties introduced. New Brunswick and home-grown seed was planted side by side for a number of years. Until 1921 the New Brunswick seed gave considerably higher yields than the home-grown seed. The season of 1921 being very bad for the potato crop in the county, poor yields were secured regardless of the source of the seed planted. The Irish Cobbler has become very popular in the county, because it has yielded well and is a good keeper. One profitable result of the illustration work in the county is that where very few of the farmers were previously using know varieties of oats, barley, potatoes, etc., all of the 16 illustration farmers and many of their neighbours are now growing varieties of proven excellence. This one point alone means much to the farmers of the county. Many of the illustration farmers have for the last three or four years disposed of all their pure seed grain and potatoes among the neighbouring farmers. A number of them state that they could have sold for seed, two or three times as much as they grew. In some instances the neighbours have brought their own ordinary potatoes and traded them to the illustration farmer for Irish Cobbler or Green Mountains which he had kept for his own table use. This shows how keenly anxious the neighbours were to obtain better seed when they saw the increased yields obtained therefrom.

Different thicknesses of seeding of clover have been tried each year. This has been very interesting and has attracted much attention in the locality surrounding each Illustration Farm.

Alfalfa and sweet clover have been tried. In 1920 one acre of alfalfa was seeded on practically each of the 16 farms, and on the whole withstood the winter of 1920-21 much better than common red clover. Many of the farms in Dundas county, however, are not suitable for growing large areas of alfalfa, in fact, the one-acre plots tried were usually placed on some particularly favourable spot. It was shown quite clearly, however, that on land which was drained either naturally or artificially, alfalfa would grow very well. It could, on many farms, be used to advantage in seeding mixtures. Sweet clover has given excellent results when used for pasture. It has in no instance, where tried, been winter killed. It has been used also for hay but is found to be somewhat difficult to cure in catchy weather. Where well cured it has made splendid hay.

Quack grass is very bad in many places through the county, and buckwheat has been used very successfully as a smother crop.

It was found that very few of the farmers were giving much attention to the home garden. The small collection of garden seeds provided each year was carefully selected from good varieties of proven merit, with the result that all of the 16 farmers report taking a very

greatly increased interest in the garden. They state that their supplies of garden produce have been greatly increased in quantity and improved in quality.

Results after Five Years

As a result of the five years' work, nine of the illustration farmers have changed the plan of their farms and fields to make systematic rotation of crops more easy, and are now practising a more suitable and systematic rotation than they did before commencing this work. They all report that the systematizing of their rotations and the other methods of management adopted have increased their yields, the estimates varying from 20 to 30 per cent. Practically all of the 16 farmers report fewer weeds on their farms than there were five years ago, and that their farms are more fertile. Fourteen of the 16 farmers state that the following of a definite plan has made their work more profitable and very much more interesting. Here is a quotation from the report, after the final year, of Mr. Sam Smyth, Dundela:—

> "Yes, it is the same old farm under a new manager. Through the Commission we have had the results of the Experimental Farm brought right home to us, which we apply to our own farm."

Fourteen of the 16 farmers state that they are now sowing varieties and strains of grain more suitable to their farm and neighbourhood. Twelve of the farmers state that they were not previously sowing selected seed. All of the farmers agree that it pays to sow selected seed and state that good seed has become a thing of much greater importance to them than previously.

The majority of them state in their reports that they were not previously sowing enough red clover seed to insure a good catch. The increase in yield of hay since the heavier seeding of clover has been practised is estimated by the farmers at from 25 to 50 per cent. Six of the farmers who were not previously growing their own clover seed are now doing so.

Eleven of the illustration farmers report making more use of labour and time saving devices than before. Ten are using wider implements than before. Ten report making more use of three or four-horse teams than previously. Nine state definitely that they are now planning and adjusting their farm work to better utilize the help on the farm than they did before.

Ten state that they are now applying the manure more advantageously while nine report that they are exercising more care to prevent waste than ever before. Practically all of the illustration farmers report that they now more fully realize the value of the farmyard manure than they did before beginning this work.

Practically all of the farmers state that they are taking more interest in their farm work generally than before, and that the young people on the farms are taking more interest than formerly.

Quotations from Farmers' Reports

Practically every one of the 16 farmers state that their yields and profits have been increased, although a number of them call attention to the fact that the profits during 1921 were low, due to a slump in prices of farm products. The increase is estimated at from 25 to 40 per cent by the various farmers.

Sam Smyth, Dundela, remarks.—"It is hard to estimate the value to us of the work conducted by the Commission of Conservation and the Experimental Farm. Not only has it been valuable from a financial point of view, but the greater interest we take in the work is worth a great deal. Our neighbours are watching our crops pretty closely and comparing their methods with ours. Many of them are adopting what we have adopted at the suggestion of the Agricultural Advisor of the Commission."

Whitteker Bros., when asked to estimate the percentage of increase in crops, state.—"It is rather hard to answer the above, but we have profited greatly from the work of the Commission and Experimental Farm, not alone financially but in other ways. Many of our neighbours have secured seed from us and are now carefully selecting their seed and sowing known varieties."

Arthur Nash, Morrisburg, speaking of increased profits, says: "Everything is so cheap now that the profits are pretty small. Thanks, however, to the Commission of Conservation for showing us how to produce more with the same amount of labour, which helps out a whole lot these times."

G. C. York, Morewood, states.—"I am not prepared at present to accurately estimate the value I have received from the Commission of Conservation and the Experimental Farm, but it has been very valuable to me. My neighbours have been continually watching me and I have found that they have been trying things out in the same manner as we have."

Arthur Christie writes as follows.—"I think my profits are fully one-third greater than formerly. My farm is cleaner, and I may say that our neighbours are following the advice given by the Agricultural Advisor in charge of this work, and are sowing known varieties of grain and taking better care of the farm manure than formerly."

Twenty-acre field of Twentieth Century Oats on the farm of W. H. Casselman, Chesterville, Ont. The grain was free from smut and weeds, and the entire crop was sold for seed to neighbouring farmers and others.

Many other such examples could be given, but these serve to show the nature of the results of the work.

During the five years of practical work on these farms in Dundas county many meetings were held in connection therewith. A number of meetings were held during the winter following the first summer's operations, at which illustrated lectures were given showing improved methods of farming, the results from various tillage methods, the results of thick and thin clover seeding, the use of labour-saving

devices on the farm, the profits to be derived from three and four-horse teams with wider implements, etc. It was interesting to find that quite a number, of the young farmers particularly, had during the winter time made at home some of the devices illustrated at these winter meetings and were to be found using them the following summer. The writer has in mind a number of specific instances where this occurred. During the years following the first season's work, that is 1918 to 1921 inclusive, a number of field yield and ability to stand winter conditions.

Inter-Township Excursions

During one summer, inter-township automobile excursions were organized, that is, the illustration farmers and their neighbours of one township motored over to the next township and visited as many of the Illustration Farms as possible during the day. Many of the farmers made a day of it, taking their lunch with them, and thoroughly enjoyed studying the results of

Farmers' Meeting.—On this field a tillage test had been conducted for the control of mustard

meetings were held on the Illustration Farms, to which all of the neighbours were invited. The neighbouring farmers took a great interest in the illustrations being conducted, there being more than 100 bona fide farmers present at some of the meetings. The results of the work of previous years were reviewed, such as the difference to be seen in thick and thin clover seeding, the effect of buckwheat as a smother crop, the results of tillage tests, comparison between alfalfa, red clover and sweet clover, as regards both the work on the Illustration Farms in the neighbouring townships. There being four townships in Dundas county, four days were given over to this work. Seeing is believing, and the studying of the crops right in the field and the results of the various improved methods adopted, strongly impressed the lessons which are derived from the use of pure seed, treatment for smut, improved methods of tillage, etc.

As an example of this the following incident, which occurred on one of the

motor trips, is mentioned. A field of oats, where the seed had not been treated for smut, was being examined. A square yard of the crop was chosen at three different points in the field and the stems on each square yard were counted. It was found that 37 per cent, by actual count, of the oats was smutted. On the next Illustration Farm visited a field of oats was examined, the seed of which had been carefully treated for smut. In fact, this man had been carefully treating his seed each year for three years. Three or four of the visiting farmers walked through the grain and examined the field very closely, but no smut was found. This proved to be a very striking object lesson to all of the farmers present regarding the efficiency of the formalin treatment of seed grain for smut. One man said, "No farmer can afford to have 37 per cent of his grain destroyed by smut."

Upon several occasions during the five years, automobile excursions were organized and run to the Central Experimental Farm, Ottawa. As many as 600 have taken these excursions upon some occasions.

Annual Conference

During each winter, while this work was being conducted in Dundas county, the illustration farmers were called together at Winchester for conference, when the results of the past year's work were reviewed and a thorough discussion of plans for improving the work during the following summer took place. These gatherings were very helpful to the farmers themselves and were also beneficial in having the farmers from the various parts of the county become better acquainted. A banquet was usually held in the evening to which a number of townspeople were invited and a general get-together spirit was thus promoted.

Boys Remain on the Farm

It is interesting to note that every one of the 16 farmers chosen in the spring of 1917 stayed with the demonstration through the full five-year period agreed upon. One man sold his farm but the man who bought it took up the work enthusiastically, and carried on in a very satisfactory manner. Seven of the 16 farmers had grown-up sons at home, there being 14 of these young men in all. It is interesting to note that not one of these 14 grown-up sons left home during the five years in which this illustration work was being carried on. The fathers of these boys themselves stated that it had added very greatly to the interest of the farm work, and that they were convinced that this increased interest had had an influence in keeping the boys from going away to the cities.

Agriculture in Schools

When the Commission of Conservation began this work in Dundas county, there were but 13 public schools in which agriculture was being taught. In less than 18 months, agriculture was being taught in 76 of the 78 rural schools in the county. This result was due to the efforts of the late J. W. Forrester, Inspector of Public Schools, and the Agriculture Advisor, in putting on a very active campaign in regard to this matter.

In the fall of 1917 the Agricultural Advisor addressed the teachers' convention in the county on the subject "More Agriculture in Public Schools." Again, in 1918, agriculture received a prominent place on the programme of the annual convention of the teachers of the county. During the summer of 1918 a large class of 28 teachers from the county took the short course in agriculture at the Ontario Agricultural College, Guelph. In 1919 a still larger class, 45 in all, from Dundas county,

took the short course, this being the largest class from any one county that had ever taken this course at the Ontario Agricultural College.

Horticultural Societies

When this illustration work was begun in 1917 there was but one horticultural society organized in the county. There are now five live societies carrying on this good work. The Agricultural Advisor and the Agricultural Representative of the Ontario Department of Agriculture took an active part in the organization of these new societies.

A very noticeable improvement in the farm home-grounds and surroundings has taken place during the last five years. Indeed, a drive through the county in the summer time is a pleasure, a fact frequently mentioned by many who have visited the county to inspect the illustration work during the last two or three years.

Miscellaneous Activities

The Agricultural Advisor has assisted in a great many other matters in the county, having acted as judge at a number of agricultural fairs, and at many of the school fairs and horticultural society flower shows. Many addresses were given during the winters and at the field meetings held on the farms. The Agricultural Advisor also judged the ploughing competitions conducted under the general supervision of the Agricultural Representative. Ploughing matches and tractor demonstrations were organized and carried out. In fact, no opportunity was lost for assisting the farmers of the county or for co-operating with the Provincial Department.

It is difficult to measure the money value of this kind of work in a community. It has been clearly shown that these 16 farmers are farming much more intelligently than they were five years ago. The neighbours are copying the work of these men, good seed of varieties of proven merit has been distributed widely, and in many ways better agriculture has been demonstrated and its gospel taught. The farmer is much more likely to put into practice on his own farm something that he sees successfully and profitably done by a neighbour, than something he only hears discussed on a public platform. One further advantage of this kind of work is that it starts the farmer thinking for himself, which is very essential to the success of his operations. The 16 men who carried on the work have co-operated most cordially. There has been confidence on their part and great expectations of benefit. All of them say they have received great benefit from the work. They have had larger crops, cleaner fields, more money, and pride of achievement, all of which is of prime importance to Canadian farming, and cannot help but exert a very beneficial influence on the surrounding community.

In conclusion the writer desires, on behalf of the Lands Committee of the Commission of Conservation and the Dominion Experimental Farms system, to extend hearty thanks to the Illustration Farmers who have so cordially co-operated in carrying out this valuable work, which, it is hoped, will serve as a guide whenever further work of this nature may be undertaken.

THE APPLICATION OF SEED LEGISLATION IN CANADA

BY C. SWEET, CHIEF, SEED DIVISION

THE object of seed legislation in Canada is threefold; first, to protect and encourage the producer of good seed, inasmuch as he is able to market his product on the basis of merit in quality and purity under standard grades; second to protect the consumer of seed, who receives protection when buying subject to these standard grades, and third, to protect the seed trade, wholesale and retail, which receives the same protection as both the producer and consumer when purchasing or selling.

The law is framed to encourage the dealer in good seed rather than the dealer in poor seed, and is also aimed to facilitate the trade in seed, both domestic and export, by virtue of the grade standards provided. This is accomplished, in part, by making it possible to buy or sell on the home market or abroad by telephone, wire or cable on any particular day's market price. Most countries already quote seed on the basis of trade names, but these are not at all uniform in character.

The marketing of commercial grain in North America under grade is now fairly well established. In the United States, wheat is divided into the six classes: Hard Red Spring Wheat, Durham Wheat, Hard Red Winter Wheat, Soft Red Winter Wheat, Common White Wheat, White Globe Wheat, and in each of these classes there are grades from No. 1 to No. 5, based upon certain standards of quality and purity.

In Canada, wheat is marketed under three classes: Spring Wheat, Goose Wheat and Winter Wheat. In our western inspection division the following grades are provided under the Spring Wheat Class: No. 1 Manitoba Hard Wheat, No. 1 Hard White Fife, No. 1 Manitoba Northern, No. 2 Manitoba Northern and No. 3 Manitoba Northern. These are the standard grades and are not varied from year to year. Standards are also provided for lower grades, which are made at the beginning of the inspection season in accordance with the quality of season's crop. Standard grades, Nos. 1, 2 and 3 for other classes of grain are provided, and the marketing of these grades is done on the basis of these standard grades.

Sample markets are used in conjunction with the grades issued by the Government inspectors, but this is only done to assist in making sales, as the transactions are finally made under the market quotations for the grades purchased.

A start was made last winter at a meeting of the International Crop Improvement Association held at the Chicago Live Stock Seed Show to discuss the standardization of International grades for registered or improved seed, with the view of putting such standards into effect.

We have in Canada one seed law, the Seed Control Act, which governs the commercial sale of seed and is applied the same in all the provinces. Each province has its own regulations on its statutes to provide protection for weed control, but in the matter of seed control no attempt is made to duplicate or institute a provincial seed act.

Under the Seed Control Act exemption is provided for the traffic in seed between farmers when delivery is taken of the seed on the farm where it is grown, unless it is represented as graded seed in which case it is sold under the Act. This exemption does not permit farmers to sell seed below grade No. 3 or in other words "rejected seed." With the exception of seed sold for feed or to seedsmen for the purpose of re-cleaning, all other seed that enters the trade comes under the Act and is sold under standard grades or labelled. Timothy, red clover, mammoth clover,

alsike, and alfalfa were the only seeds at first required to be graded, but now all cultivated clovers and grasses may be sold under the same grades, and seed grain, corn and flax seed are also sold under special grades. If these two latter groups are not sold under grade they are sold subject to labelling with the name or names of the noxious seeds if present over a certain number per ounce or pound. These grades are, in the case of grasses and clovers, Extra No. 1, No. 1, No. 2, No. 3 and Rejected, and with grains, Extra No. 1, No. 1, No. 2, and are based upon standards of purity, germination and general quality of the seed. These standards are fairly definitely set and do not require much altering from year to year with the exception of general quality, which may be slightly raised or lowered to meet the requirements of each year's seed crop. In practice this latter point is arrived at through consultation between the Seed Commissioner and Chief of the Seed Division and the Wholesale Seed Trade, who meet annually and bring samples and compare qualities to arrive at minimum quality standards for the different grades. Grades are also provided for grass and clover mixtures. Vegetable and flower seeds are not required to be graded but are sold subject to labelling the packets, with the year in which they were filled, if sold in sealed packets, and to marking with the percentage of germination if the germination falls below certain fixed minimum standards. The marking of percentage germination applies to all seeds the same as to vegetables.

Penalties for violations of the Act are provided and the provisions and regulations of the Act are enforced equally and without favour in all the provinces.

In addition to the Seed Control Act, Canada has seed importation regulations which control the import of seed, making it necessary for imported seed to come under the same regulations as domestic supplies, and prohibiting entry of shipments refused entry to another country or of rejected seed. The provision has been made under these regulations whereby any exporter of seed to this country may have his shipments delivered direct to the purchaser without being held at the port of entry by the customs official. To take advantage of this regulation, exporters of all kinds of seed with the exception of vegetable and flower seeds should submit representative samples of each shipment to any of the Canadian Government Seed Laboratories for official test and grade, marking these test numbers and grades, when received, on either the bags or invoice. Such shipments upon arrival in this country are sampled and reported to the Seed Branch and delivered to the purchaser without any delay. If they are not marked with the Canadian test number and grade, the seed is sampled and held in bond, pending report from this Branch as to its eligibility for entry. The former course is preferred as it causes no delay or inconvenience by the Canadian importer at a time of the year when he usually requires his seed for immediate use. The privilege of delivering seed marked with the grade and test number, without holding in bond, and a report of the analysis may be cancelled to any exporter of seed to this country, if it is found that the practice of marking a wrong grade on the seed is being followed. Shipments of root and vegetable seeds may be delivered without holding in bond to all consignees and without requiring any special markings.

The organization for carrying these laws into effect is vested in the Seed Branch of the Dominion Department of Agriculture. The Commissioner and Chiefs of Divisions comprise the headquarters staff at Ottawa, and the outside work is divided into six districts under the direction of District Inspectors having headquarters at Truro, Quebec City, Ottawa, Toronto, Winnipeg and Calgary. Each District Inspector

has under his supervision a staff of permanent and seasonal inspectors whose duties are to see that the Seed Control Act is observed by all dealers within their inspectoral territory; and in addition, they study seasonal seed supplies and markets which are reported to Ottawa where the information is assembled and put into shape for publication by the Markets Division.

Four Seed Laboratories serve the growers and seedsmen, these being located at Ottawa, which is the Central laboratory serving Eastern Ontario, Quebec and the Maritime Provinces; Toronto, which has lately been opened for Western Ontario; Winnipeg for Saskatchewan and Manitoba and east to lake Nipigon; and Calgary for Alberta and British Columbia.

Following the testing of seeds in the laboratory, certificates of analysis, giving the names and number of weed seeds and impurities per ounce or pound, and the official grade are mailed to the parties sending the samples.

Quality Standards

For the purpose of grading seeds we have two main groups including, grasses and clovers and seed grains. The standards for grasses and clovers are as follows:—

—	Noxious weed seeds per oz.	Other weed seeds per oz.	Other cultivated seed per oz.	Cleanliness	Minimum germination
Extra No. 1	0	30	Trace	Clean	90%
No. 1	5	100	1½%	Clean	85%
Alsike	10				
No. 2	20	200	3%	Reasonably clean	76%
Alsike	40				
No. 3	80	400	5%	.....	63%
Alsike	160				
Rejected	over 80	over 400	over 5% Grade a mixture		

Twenty-four species of farm weeds are included in our noxious weed seed list. These are the most troublesome weeds found in the Dominion. Of course, no one district would have all the weeds on this list, but as we have only one seed law, we have therefore only one noxious weed seed list. In the administration of the law we find that it works out to advantage to have the complete noxious list apply in all the provinces as this is a protection in the interchange of seed from one province to another.

The other weed seeds included in the second general heading affect the grade of the seed, as noted, according to the number per ounce found in the sample.

Cultivated seeds are considered separately from weed seeds and percentages by number are used in grading grass and clover seeds and the number per pound in grading grains.

Cleanliness as the heading implies, refers to the condition of the sample in respect to cleaning. No sticks, straws, dirt or other inert matter are allowed in the higher grades, Extra No. 1 or No. 1, and the seed must also be well milled to remove the small or shrunken seeds, leaving a uniform sample to come under these grades. A slight variation is allowed in this respect for Grade No. 2. Seed containing weed seeds up to the number specified for Grade No. 3 or otherwise unfit for No. 2 seed is graded No. 3. This grade, consequently, is not in very great demand in this country.

Under the last heading, germination, colour and soundness are considered. We do not lay much stress upon colour, except as being an indication of the vitality of the seed. If a sample of grass or clover seed is dull in colour and

contains shrunken, brown seeds or is musty or has any other indications as to its vitality being impaired, such a sample is held for germination test before the grade is given.

Grades for seed grain are Registered, Extra No. 1, No. 1 and No. 2. The standards included in the first two grades may be briefly stated as requiring a minimum of 95 per cent for Registered seed and 90 per cent minimum germination for Extra No. 1, and that they both be as nearly pure as to variety as it is possible to get them. These grades are only issued when the combined inspection of the growing crop and the cleaned seed indicates a conformity to all the requirements of the grade.

At the present time Registered seed is handled by the Canadian Seed Growers' Association, but it is expected that this grade will be included in the Seed Control Act, thereby receiving the same protection by law as the present government standards. This arrangement will also bring into practice the principle of government guarantee of genuineness of stock, which is being requested by a number of careful purchasers requiring high-class pure variety seed. No. 1 seed grain is a commercial grade of seed, the purity of variety of which is not vouched for, but is clean, of standard weight and contains not more than one noxious weed seed per pound and germinates not less than 80 per cent. No. 2 seed grain is the same in all respects as No. 1 except that it may contain up to ten wild oats per pound. These two grades were made to meet the general demand for a good safe class of seed to buy in commercial quantities for annual requirements.

SEED PRODUCTION IN ALBERTA

BY G. M. STEWART, DISTRICT INSPECTOR, SEED BRANCH

DURING the past year Alberta again led all the provinces of Canada in the production of seed, both in the quality of the seed produced and in the resulting cash returns received by the growers. The fertility of the soil, the prevailing climatic conditions, and the careful attention that is being given the various farming problems in that province by the growers themselves and the men connected with the Federal and Provincial Governments, have brought seedsmen of both Canada and United States to realize more than ever that Alberta cannot be surpassed in the production of seed grains, as well as many varieties of clovers and grasses. Sufficient proof of the splendid achievements in seed production was given at the Chicago International Hay and Grain Show last December, and the results of Alberta's exhibits undoubtedly turned the attention of all those interested towards this province. Alberta growers secured the highest awards possible for oats and alfalfa seed, in competition against all comers. In addition to these awards many other prizes were secured for wheat, oats, peas, alfalfa, and clover. It was largely owing to the gaining of these awards that many sales were afterwards made to dealers in Eastern Canada and the United States. In the case of certain varieties the demand far exceeded the supply available.

During the past couple of years, a great impetus has been given the production of high grade wheat and oats, through the co-operation of the Field Husbandry department of the University of Alberta and a number of the progressive farmers of the province. These men secured from that department, seed wheat and seed oats of known strains, pure as to variety. This seed was sown under the best conditions possible, and proper inspection was given the growing grain and the seed finally produced. If the inspector reported favourably,

the seed was given registration with the Canadian Seed Growers' Association, which is the only organization registering seed in Canada. As the yields in many cases were greater than those secured from seed of unknown origin, other farmers became interested and in return procured and seeded purer varieties, with the result that several thousand bushels of registered seed oats and wheat were produced in the province last year; and there is every reason to expect that this year there will be many thousand bushels of these pure varieties of seed ready for distribution in the province, with a surplus for shipment to other provinces and countries.

Alberta's oat crop has long been a matter of pride to our farmers, and it is interesting to learn that about half a million bushels of No. 1 Seed Oats were shipped out of the province this spring. This seed was purchased by farmers in every province east of us, as well as by many in the Northern and Central States.

Agriculture throughout Southern Alberta has experienced many reverses, but as larger areas are brought under irrigation, and better farming methods are practised, better conditions are certain to result. Moreover, Alberta has been most fortunate in securing exactly the type of settler this southern country demands. These settlers are, for the most part, men who have come from irrigated districts in the United States, and they are able to carry on successfully the work of farming on our irrigated lands. They are largely responsible for the great success of those districts.

As all farmers familiar with this type of farming realize that alfalfa is one of the best crops that can be produced in irrigated areas, particular attention has been given to the problems connected with alfalfa production. As many varieties of alfalfa are not hardy enough to withstand the rigorous conditions which the climate imposes, there have been, unfortunately, many disappointments. However, the difficulties have for the most part been overcome, and it has been demonstrated that genuine Grimm alfalfa is quite suited to the climate, and farmers are insisting that seedsmen supply them with this particular variety of alfalfa seed. With a view to assisting in the production of this variety, agricultural experts employed by the Federal and Provincial Governments, and the Canadian Pacific Railway Department of Natural Resources have been giving a great deal of study to this plant, in order that more definite information might be secured as to its habits. This work has resulted in the registration of this seed by the Canadian Seed Growers' Association. During the past year some eight thousand pounds of genuine Grimm alfalfa seed were registered with this association, and marketed by growers in the Brooks district. As yet this is the only district that has been able to produce Grimm alfalfa seed acceptable for registration, and it was some of this seed that secured first place at the Chicago Fair last year. Largely on account of past successes, a large increase in the acreage sown to this crop will be made this spring. It is expected that at least ten thousand acres will be added to the present area producing alfalfa on irrigated lands.

Both the Federal and Provincial Governments have been making greater efforts than ever before to interest farmers in the production of high quality seed. New varieties of clovers and grasses have been introduced from Europe by the Seed Branch of the Dominion Department of Agriculture, and distributed throughout the province to several dependable farmers with a view to having the different seeds tested out. If they are found to be suited to our climatic conditions the production of these new varieties will be encouraged, as a ready market in Europe can be relied upon for large amounts of the seed.

In the so-called Peace River district of Northern Alberta, it has been demonstrated that timothy seed can be pro-

duced much more profitably than grain crops, and during the past year a considerable quantity of timothy seed has been marketed from that part of the country. Many farmers throughout that new district would be well advised to give particular attention to the growing of timothy seed, rather than to devote their whole attention to the growing of grain crops, as a profitable market for large quantities can be found yearly in Eastern Canada as well as in Scotland and England.

It is generally agreed among agricultural authorities interested in the improvement of grain production in this province, that the best method of bringing up the general standard of the various grains produced in Alberta is for each farmer to follow the practical plan of setting aside each year a small area of well prepared clean ground to be seeded with registered seed which he knows to be suited to his prevailing conditions. The seed obtained from this plot should be set aside for his own use the following spring. If all farmers would follow out this suggestion, Alberta would probably outdistance all the other provinces of the Dominion in the production of clean grain of high quality, which would find a ready market and prove most profitable to the producer.

PART II

Provincial Departments of Agriculture

NEW BRUNSWICK'S ACTIVITIES UNDER THE AGRICULTURAL INSTRUCTION ACT

BY O. C. HICKS, B.S.A.

TO the province of New Brunswick, which derives its revenue mainly from the Crown domain, the financial assistance provided by the Agricultural Instruction Act is the chief means through which the development of educational and demonstrational work in agriculture is made possible.

At the time the Act was passed, the province was without an educational policy on agriculture. There were no agricultural schools; hence there had been no courses of instruction offered in scientific agriculture. There was but one dairy school, which was in use as a commercial creamery and accommodated short-course dairy students for a term of only six weeks each year. Women's Institutes had been established; but in livestock, dairying, horticulture, and poultry-keeping, demonstrational work had only begun, while assistance to other phases of agriculture had been confined to the lecture method, and was carried on by a corps of lecturers travelling on demonstration trains and by itinerant agricultural institute speakers. Agencies such as these, already established by the provincial department, had been working to supply information and education to the farming community; and to meet the administration expenses of such work, including the encouragement of Agricultural Societies, a provincial appropriation had been made annually. For the year 1912 this appropriation amounted to $41,745.69. For the past nine years an average of $82,712.46, and a total of $744,412.19, has been granted by the provincial Government. The Agricultural Instruction grant has been used to supplement this work as well as to develop some new lines of endeavour. The total expended from this subsidy to March 31, 1922, was $524,420.59.

From the grant has been met the costs of the erection, equipment and maintenance of various buildings designed to facilitate the teaching of agriculture. A building in which to hold regular courses of instruction in general agriculture was erected and equipped at Sussex. Similar equipment was installed at the Fisher Vocational School, Woodstock. Two dairy schools, one at Sussex and the other at St. Hilaire, were provided, but the cost of equipment only of the Madawaska Creamery, St. Hilaire, was charged to the grant, while the cost of the Dairy Building and equipment at Sussex (destroyed by fire in December, 1917), was met from this source.

Dairying

The appropriations for dairying were used to conduct annual dairy short courses, and to provide for aid to the makers of dairy products through a system of factory and creamery inspection. Two inspectors are employed.

A reconstruction period in the dairy industry in this province has been in progress. The small creamery is passing, and the new era has brought the centralized creamery in its place. There are now three large co-operatively owned creameries operating. One is situated at St. Hilaire, one at Moncton, and one at Fredericton. The amounts paid to patrons of these creameries for the

past year were, $23,939.93, $192,995.92, and $60,918.10 respectively.

The cheese industry has so strengthened under a system of factory inspection, grading and marking of the product that New Brunswick cheese is now sold on its merits in competition with the best of Canadian cheese. The system of sales by "boarding" for cheese and butter marketing was introduced in 1919. An annual dairy show was instituted in that year, at which during the past three years samples of the make for each month from factories and creameries were exhibited.

Livestock Encouragement

Encouragement to the livestock industry under the grant has been extended by maintaining a staff which directs its efforts towards the improvement of farm breeding stock, the introduction of new marketing methods for livestock products, and to the establishment of Boys' Clubs.

A policy of aiding Agricultural Societies to purchase pure-bred bulls by a cash bonus has required that every animal for which an application for the bonus has been made shall be inspected and graded by an official of this department. Furthermore, each animal must be tuberculin tested and declared to be a non-reactor before being eligible for a bonus. The inspection and testing of these animals and likewise the inspection and certification of stallions under the provisions of the New Brunswick Stallion Enrolment Act are performed by officials of this division.

The extent to which wool grading and co-operative selling has developed in the province since the inauguration by the Live Stock Division in 1918 of a campaign to popularize the selling of wool in the grease is as shown by the following:—

	1918	1919	1920	1921
Amount handled	31,735 lbs.	55,840 lbs.	69,449 lbs.	41,070 lbs.
Number of patrons	317	547	674	340

Boys' Pig Club work has been conducted very successfully. Through the workings of these breeders' clubs the number of pure-bred pigs kept for breeding purposes has been increased.

Poultry

A most significant change has taken place in the attitude with respect to the farm flock since the era of poultry demonstration work under the Agricultural Instruction Act began. Previously little attention had been devoted to egg production on the farm. Now poultry keeping is conceded to be an important branch of farm economy, and an industry which constitutes a foundation stone in a greater industry.

Through educational propaganda for modern poultry house construction, the operation of poultry fattening stations, the establishment of egg circles, the distribution of pure-bred utility poultry through eggs and day-old chicks from bred-to-lay strains, the conducting of laying contests, and the establishing of Boys' and Girls' poultry clubs, every phase of poultry keeping—with the possible exceptions of the marketing problem and the business of wholesale raising of day-old chicks—has been modernized and developed to a considerable degree.

One result of the establishment of Boys' and Girls' Clubs has been the standardization of the poultry product. One variety of chickens only, the Barred Plymouth Rock, was adopted for club work. Eighteen clubs were organized with a membership of 242 and 222 in each of the years of 1918 and 1919. These clubs represent a distribution of 21,565 hatching eggs and 1,340 day-old chicks. In addition to the club distribution several thousand Barred Plymouth Rock hatching eggs were procured by the Poultry Division for distribution to school children under the

supervision of the Elementary Agricultural Education Division.

Soils and Drainage

The appropriations under this caption were expended on demonstration work for fertilizers, lime pulverizing, farm under-drainage, clover seed production, and field crops experimentation.

To carry to a successful issue the plan of work relating to these subjects, a staff of instructors and demonstrators was provided and a portable lime-pulverizer, a clover huller, a traction ditcher, and a tile making machine were purchased and operated.

As a result of demonstrations in compounding fertilizers, a considerable saving to individuals has been effected by the abandonment of the practice of buying factory-mixed goods in favour of buying fertilizer constituents and mixing them on the farm. A soil survey of arable land to ascertain the soil reactions was instituted, while field experimental work has been conducted, concurrently with the working of local limestone deposits, to demonstrate the response in crop yields to liming with pulverized limestone.

The clover-huller has been operated by the Department as a demonstration feature to encourage farmers to grow their own seed. Previous to its introduction very little red clover seed was produced in the province. Hundreds of farmers are now so thoroughly convinced that clover seed-growing is a profitable undertaking that they now own share-stock in itinerant clover-hullers.

An important work in the reclaiming of wet land has been performed through the campaign for under-drainage. Demonstrations in trench digging by machine and in tiling were conducted in eight counties. Consultations, surveys, specifications, estimates, and drainage maps were made by the officials connected with this campaign.

Horticulture

The development of the apple growing industry at a rapid rate followed the provision of a provincial horticulturist and staff by means of the assistance furnished by the federal grant.

Demonstration and commercial test orchards have been established; illustration orchards have been supervised; apple-packing schools and short courses in horticulture have been conducted; co-operative apple shipments have been encouraged, and fruit exhibits prepared.

The test orchards have demonstrated the advantage and profit of renovating neglected trees, as well as the most economical cultural practices, and the fact that the extension of the industry depends upon the planting of suitable varieties.

The examination of orchards and of orchard sites, and the giving of assistance in pruning, spraying, grafting, and planting of orchards has been carried on, as well as the handling of nursery stock, spraying materials and supplies for the New Brunswick Fruit Growers' Association.

Bee Keeping

The Apiary division, which owes its inception to the Agricultural Instruction Act, has done a great deal to spread a knowledge of correct beekeeping methods. The status of the industry when the division was organized is indicated by the fact that many bee-keepers were using old fashioned box hives, and smothering off the surplus swarms in the fall.

The industry has now progressed to a point where movable frame hives, manufactured within the province, are in general use. Out-of-doors wintering is practised, and the province produces nearly sufficient honey to supply the local market.

The New Brunswick Bee-keepers' Association, with a present membership of one hundred and thirty-eight, has been organized, and during the past

two years handled supplies to the value of five thousand dollars.

So effective is the control of bee diseases under the Apiary Inspection Act that the province is now believed to be free from Foul Brood.

Women's Institutes

The allotment to Women's Institutes provided for an annual grant of five dollars to each branch institute as well as financing the work directed by the Institute division. An organizer and a staff of demonstrators have been maintained, and short courses in home economics have been conducted at practically all points where accommodation could be secured.

In the nine years that have elapsed since the grant became operative, the Women's Institute movement has grown from an organization having forty-one institutes with 856 members to one having ninety-four branches with a membership of approximately five thousand.

The Institutes occupy a unique position in the community. No question of race, religion or creed is permitted to obtrude itself in the councils of the institutes, but only such matters as have to do with the betterment of social, educational and industrial conditions are dealt with. The Institutes co-operate with government departments and other approved organizations whenever necessary. During the war their response to the call of the Empire was most praiseworthy. Large sums of money and immense quantities of clothing and soldiers' comforts were forwarded. In the period following, the institutes have given liberally to war relief and to public charities at home. Due to the efforts of this organization rest-rooms for women have been built, civic improvements have been effected, war memorials have been erected, and organized nursing has been promoted during periods of epidemic.

Elementary Agricultural Education

In providing for elementary instruction in nature study and agriculture the Department of Agriculture was brought into close relationship with the Board of Education by the New Brunswick Schools Acts. A Director of Elementary Agricultural Education was secured, and under his supervision, the prescribed course of instruction, including school gardening, home plots, and home-projects was instituted in the public schools in grades I—V (ungraded) and grades I—VIII (graded).

In order that qualified teachers may be available, special courses of instruction are provided at the summer schools of science. The full course covers two summer sessions and leads to a certificate. Cash bonuses are paid under certain conditions to teachers that hold certificates and conduct school gardens, the minimum being ten dollars and the maximum twenty-five dollars. School trustee boards are paid grants up to fifty dollars to assist in the purchase of seed and equipment for the school garden. Gardening and poultry rearing as home projects have been encouraged. Seeds and eggs are distributed to pupils undertaking, with the parents' consent, to conduct projects, keep records, write a composition, and to exhibit their produce or stock at a school fair. Trained supervisors visit each pupil having a garden or project and give the necessary instruction.

A monthy bulletin, *The Rural Education Monthly,* is published and issued to all rural teachers as a medium of communication between teachers and the Department.

Agricultural Representatives

The agricultural representative service, instituted in 1917, is maintained jointly by funds supplied through the Federal grant and by provincial appropriations. Salaries and travelling expenses are charged to the grant and office rent to the provincial appropriation. Two offices only are maintained at present. The agricultural representative service has given assistance in carrying on the propaganda undertaken by the Department for improved sires;

for wool marketing, and for the better care of the flock. Very successful short courses for young farmers have been instituted.

Other Work

Other important work performed under the Act includes the campaign for the suppression of the Brown-tail moth and for the eradication of powdery scab of potatoes. The cost of the preparation and printing of bulletins and circulars for the dissemination of information on agricultural subjects has also been met from the subsidy.

THE MANITOBA AGRICULTURAL SURVEY

THE chief purpose of the Manitoba Agricultural Survey begun in 1921 by the staff of the Manitoba Agricultural College with President Bracken as chairman of the Survey Committee, has been to obtain the actual facts affecting the profitable production of crops and live stock on the farms of the province, and to enquire into the general economic and social conditions obtaining in the different parts of the province.

The work so far done includes a detailed survey of fifteen representative municipalities and a general study of the whole of the settled area. The particular features enquired into were crop yields; the fertility of the different soils; the climatic conditions; the cropping practices in vogue; farm organization as it affects efficient and permanent production; marketing practices and the effect of quality of product on process and profit; the financial state of the farmer; the distribution, increase, movement, and nationalities of the population; the living conditions of the different communities, and the general economic condition of the industry.

Except for the work of editing, the following information is now available for the final report:—

1. A summarized statement by the Chairman of the Committee, President Bracken.

2. A copy of each of the maps, charts and diagrams prepared to represent graphically some of the results arrived at.

3. A statement of the geology of the soils of the southern part of the province.

4. A statement discussing the question of the composition and fertility of southern Manitoba soils so far studied.

5. A brief but unfinished treatise on the climate of Manitoba.

6. A short statement on the population of Manitoba, touching upon the distribution of the radical types; increase in population in certain districts, and the decrease in others.

7. A statement on the forestry resources of Manitoba.

8. A comprehensive statement dealing with the various natural resources of the province, including mining, fishing, the fur catch, and water powers.

9. A statement showing the history and present condition of that phase of agriculture which deals chiefly with crop production.

10. A preliminary report on the live-stock situation.

11. A statement on horticulture in Manitoba.

12. A brief statement regarding weeds.

13. A report on the losses caused by insects and the best methods for their control.

14. A report on the plant disease situation, including the remedial treatments recommended.

15. A statement on farm profits, costs and prices.

16. General reports on the agricultural conditions in the municipalities of Arthur, Brenda, Swan River, North Cypress, Whitemouth, and Gilbert Plains.

In his summary of the work to date, President Bracken presents a number

of instructive facts which the survey has emphasized.

Of the $100,000,000 of agricultural wealth produced annually by the province of Manitoba, $70,000,000 comes from crops, $25,000,000 from live stock (dairy products, cattle, sheep, and swine), $5,000,000 from poultry, and $250,000 from bees. Other primary sources of wealth comprise mines, fisheries, forests, and furs, aggregating $7,250,000 annually; so that the importance of agriculture is overwhelming in comparison.

Among farm crops the high relative value is noted of wheat $35,000,000, oats $15,000,000 and barley $8,000,000; while dairy produce, $12,000,000, and cattle, $10,000,000, bulk large among the live stock products.

The average size of the Manitoba farm at the present time is given at 288 acres and the total number of farmers is placed at 55,000.

The chief limiting factor in the yield of crops is the relatively low rainfall; but the distribution is favourable, as a large proportion of it comes during the period of crop growth. Another important factor is the frost-free period, which ranges from 70 days in the north and west to 110 days in the south. The shortness of the frost-free period compared with that of areas farther south limits annual crops to such as are quick maturing, and the low winter temperature limits perennial crops to such as are very hardy. Fortunately the experimental work that has been done, states the report, gives accurate and wholly trustworthy information as to the crops best suited to Manitoba conditions.

Another feature of the climate, the effect of which has not been given sufficient consideration by the crop grower, is the wide and frequent variation in the matter of precipitation and frost-free periods. These departures from normal cause the greatest losses in districts having the lowest precipitation and those having the shortest frost-free period.

The best soils in Manitoba are found to be equal in essential plant food to the best land in Illinois and Iowa, and are richer in organic matter than those soils.

The effect of a generation of cropping of wheat has been to reduce the nitrogen of the first 7 inches by 20 to 30 per cent, the phosphorous content by an equal amount, and the organic matter by 20 to 50 tons per acre, so that in one generation a quarter of the potential wealth of the surface soil has disappeared. In three decades the average yield of wheat in Manitoba has dropped from 19 to 15 bushels per acre. Nevertheless, Western Canada, with 100 bushels per capita per year, produces more wheat per man than any other part of the world.

Decreased yields through a period of years is nature's warning that soil restoration should be commenced.

Concurrently with the general agricultural survey, a soil survey of the province is being conducted. Results of the chemical analyses hitherto made indicate high potential productiveness. This is reassuring because of the fact that strong soils, now giving decreased yields, can be made through proper methods of treatment to produce larger yields and to continue to grow crops profitably for succeeding generations.

Judging from the composition of virgin and cultivated soil in the older parts of Western Canada, the time has arrived, says the report, when the one-crop system must give way to diversified cropping and soil maintenance.

The live stock population of Manitoba has increased steadily and more rapidly than the wheat acreage. More live stock is required, but live stock is not a popular line of farming, and before it will become so, there must be an aggressive, constructive policy in regard to markets and markets intelli-

gence service. The survey makes apparent that better finishing, saner marketing, and the elevation of the live stock business to a main issue, wider markets, and reduced transportation charges are essential if producers are to be expected to enter into the production of live stock to anything like the extent that is desirable.

No attempt is made to arrive at the cost of producing wheat as this varies with every farmer, every district, and every season. The opinion is expressed that cost of production studies should at once be commenced for the purpose of arriving at the system of farm organization best adapted to the different soil and climatic zones of the province.

Among the losses in farming that are in part preventable, the report instances stem rust, which has caused an average annual loss of over five million bushels of wheat each year since 1916. The extent of insect depredations varies widely from year to year, but it is estimated that the value of production is lowered by seven million dollars annually. Reduction of the wheat crop in Manitoba in 1921 by the Western Wheat-Stem Sawfly, amounted to 3,555,000 bushels.

Weeds cost the Manitoba farmer $20,000,000 per year. This is nearly seventy times the annual outlay on the agricultural college.

Every forty million bushels of wheat shipped out of Manitoba takes from her soil plant food having a replacement value of $12,000,000.

The chief means by which such losses as the above may be reduced to a minimum at the smallest cost is by diversification. The problem in this connection is that of readjusting the organization of the farm. This includes the choice and acreage of each crop, the breed and number of each class of live stock, the rotation to be followed on each soil type and in each climatic zone, so that the greatest return may be secured from the land, from the capital invested, and for the effort put forth.

Other matters which are briefly discussed in the report include Farm Labour, Community Life, Rural Standards of Living, Conditions in Southwestern Manitoba, Rural Discontent, and the future programme in connection with the survey.

AGRICULTURAL LEGISLATION, 1922

NEW BRUNSWICK

An Act to provide for the incorporation of associations for co-operative Marketing of Farm Products.—This Act provides that where ten or more persons desire to constitute themselves a body corporate for the purpose of marketing farm products co-operatively, and for acquiring and holding necessary land, they may become so by filing in the office of the registrar a certificate in the form prescribed, and rules and regulations verified by affidavit. The fee for filing is fifty cents. Such an association may have field organization of local egg circles, live stock clubs or other similar community clubs, and all producers in the vicinity may become members by the purchase of at least one share of the capital stock of the central association. Individual holdings of shares shall not exceed two thousand dollars in value.

The Act provides that, before an association commences operations, the members shall agree upon and frame a set of rules for the regulation, government and management of the association which shall contain (1) a mode of convening general and special meetings; (2) provisions for audit of ac-

counts; (3) power and mode of withdrawal of members; (4) appointment of managers and other officers and their respective duties, and a provision for filling vacancies caused by death, resignation and other causes; (5) also provision for arbitration, likewise provision for making and collecting assessments against members on their stock; (6) and general procedure of doing business.

Disputes shall be settled by arbitration. The liability of shareholders is limited to the amount of his share or shares subscribed for. Surplus profits are to be distributed among the members in proportion to the business supplied by each member of the association.

The Women's Institute Act.—This Act defines the objects of Women's Institutes (which are to be non-sectarian and non-partizan) as being for the improvement of social conditions in rural and other communities, and specifies the lines of work in which they may engage; also the procedure to be followed in organizing and incorporating such institutes, the qualifications for membership, the methods of procedure in the election of officers, the appointment of committees, the holding of meetings, the enactment of by-laws and regulations, etc. Provision is made for an annual grant of ten dollars subject to certain conditions being complied with. Also for the disorganization of institutes and the liquidation of assets. Institutes already in existence may be declared to be incorporated.

The Act further provides for the appointment of a superintendent, and such other officers as may be required. Also for the institution of a provincial advisory board to consist of the Deputy Minister of Agriculture, the Superintendent, and seven or more members chosen at the annual convention; provincial directors of the Federated Women's Institutes to be members, ex-officio, without voting power.

Junior Women's Institutes may be formed under the Act by fifteen or more girls between the ages of 14 and 18 years inclusive; the objects, method of incorporation, etc., being defined.

AGRICULTURAL APPROPRIATIONS

	1921	1922
Grants to Agricultural Societies	$24,000 00	$24,000 00
Brown-tail Moth Extermination	.....	.....
Butter and Cheese Factories	5,000 00	5,000 00
Bonus to Mud Dredges	1,000 00	500 00
Contingencies	4,200 00	3,500 00
Departmental Salaries	7,333 33	8,900 00
Departmental Travelling Expenses	3,300 00	3,300 00
Encouragement of Horticulture	1,700 00	1,700 00
Immigration	10,000 00	8,000 00
Miscellaneous and Insurance	2,000 00	800 00
Encouragement of Poultry Raising	3,000 00	2,000 00
Encouragement of Stock Raising and Dairying	9,000 00	9,000 00
Standing Crop Competition and Seed Fairs	5,200 00	5,200 00
Bonus to Wheat Mills	2,500 00	2,000 00
Maritime Stock Breeders' Association	1,000 00	1,000 00
Lime-rock Crusher and Power	1,000 00	900 00
Exhibitions	18,583 87	18,000 00
Extermination of Insect Pests	200 00	200 00
Printing	.....	3,000 00
Grants to Women's Institutes	750 00	750 00
	$99,767 20	$97,750 00

SASKATCHEWAN

An Act to amend an Act to incorporate the Saskatchewan Co-operative Stock Yards.—Amending Acts were passed dealing with the original Acts creating the Northern and Saskatchewan Co-operative Stock Yards, Limited. In both cases the amendments were the same.

Section 10 in each of the Acts has had added to it power to the company to establish, lease, buy, sell and operate a public killing station in which live stock can be killed and prepared for consumption.

An amendment is also made to section 16 of the original Acts in the matter of disposition of earnings, the following being added: "Provided that such dividends shall be cumulative and that the company may pay out of such surplus unpaid dividends for preceding years."

An Act to amend The Egg Marketing Act.—Section 3 of the original Act has been repealed and the following substituted: "No person shall buy for resale or sell or offer for sale eggs which are unfit for human food."

Section 5 of the original Act has also been repealed and the following substituted: "Every person who receives on consignment or buys eggs for resale, whether from producers or from any other source shall candle the same." This section, however, will not apply where the eggs are candled for such person within twenty hours of the receipt thereof and under arrangements approved by the minister. It is also now provided that all eggs which have been in storage for more than thirty days shall be candled when removed therefrom. Eggs found by candling to be unfit for human food shall, if stamped with a mark capable of identifying them as the property of the producer who offers them for sale be re-candled in his presence if he so requests.

A dealer in eggs must in future keep his license in a conspicuous place on his premises. It is further provided that inspectors shall have access to all stores, warehouses and premises where eggs are bought, sold or stored for the purpose of inspection. The Act came into force on March 1.

An Act to amend The Farm Implement Act.—Section 3 of the original Act which provided that the Act should apply to the sale of all implements in the province has been repealed and the following substituted: "This Act shall not apply and shall be deemed never to have applied to sales of implements by persons other than manufacturers and dealers but nothing in this subsection shall affect the rights of parties to any action or proceedings pending at the date when this Act came into force."

The Act came into force upon assent, February 9, 1922.

An Act to amend The Horse Breeders' Act.—The only change to the original Act made by this amending Act is in connection with the expenses paid to members of the stallion board. Subsection 3 of section 10 of the original Act is repealed and the following substituted: "Members shall be paid their hotel and travelling expenses while attending meetings of the board. Members other than those whose whole time is at the disposal of the Government or of the University of Saskatchewan shall receive, in addition, an allowance of $7 for each day or part of a day spent in attending meetings of the board.

An Act to amend The Stray Animals Act.—Under this amending Act it is provided that the council of a municipality may make by-laws for licensing and controlling herders and determining the conditions under which they shall be permitted to herd animals within the municipality, provided such by-laws do not conflict with any by-law passed under section 4 of the original Act and are otherwise in accordance with the provisions of the Act.

The section of the original Act dealing with the issuance of notice of an estray in the pound where the owner is not known has been amended to provide merely that if such owner is not known the poundkeeper shall take his action in the matter of publishing notice in the *Saskatchewan Gazette* without waiting for the expiry of ten days as in the original Act.

The law is also made more clear with regard to the sale of an estray where the owner is known and other points of procedure.

An Act to amend Municipalities Seed Grain Act.—Additional sections are put into the original Act by this amending Act having to do with renewal statements of liens given for seed grain. It is provided that the secretary-treasurer may, within thirty days before or at any time after the expiration of two years from the date of the lien agreement, and from time to time as long as anything remains due in respect of the seed grain advance, renew the agreement by registering a statement showing all payments made on account therefore and the amount remaining due for principal and interest.

This statement when registered shall create a charge in favour of the municipality upon all crops to be grown by or for the seed grain purchaser upon the lands mentioned in the original application during the year in which the statement is registered and the succeeding year subject to existing registered incumbrances.

An Act to amend The Seed Grain Advances Act, 1920.—A new section is added to the original Act having to do with mortgages obtaining title by voluntary transfer. The section reads as follows: "If a mortgagee who has made an advance which has been added to the amount secured by this mortgage and who has entered into an agreement with the government in form A, obtains title to the mortgaged premises without proceedings in court or in the land titles office, the Provincial Treasurer may, notwithstanding anything contained in the said agreement, pay to the mortgagee such lesser sum as may be agreed upon between the treasurer and the mortgagee in lieu of the amount guaranteed by the agreement.

"In such case the mortgagee shall be deemed for the purposes of the agreement to have obtained a final order of foreclosure of his mortgage, save that the liability of the government under its guarantee shall be limited to the amount so agreed upon."

The Seed Grain Advances Act, 1922.—This Act provides that any mortgagee of land in Saskatchewan, whether under a mortgage heretofore or hereinafter made, may make advances of money to the owner of the mortgaged land or any part thereof to enable him to purchase seed grain.

When such advance is made it may be added to the amount secured by the mortgage which sum shall become part of the moneys so secured, bearing interest at the mortgage rate, being a charge upon the mortgaged land and shall be payable on the first day of November of the year in which a crop produced by the grain purchased by the advance would be harvested, or on such other day as may be specified in the application for the advance.

Where the land is subject to more than one mortgage no subsequent mortgagee shall be entitled to the benefit of the Act who makes an advance without the consent of all prior mortgagees.

Provision is made whereby any owner who obtains an advance under the Act and who expends it otherwise than in the purchase of seed grain or who sells or disposes of the seed grain purchased with such an advance will be guilty of an offence and liable upon summary conviction to a fine not exceeding $500 or to imprisonment for any term not exceeding two years, or both.

An Act to amend The Agricultural Co-operative Associations Act.—The

procedure for incorporation has been changed by this amending Act and now reads as follows: "Any five or more persons who desire to associate themselves together as an incorporated association for the purpose of producing, purchasing or selling live stock or farm products on the co-operative plan, or for establishing and operating on such a plan any business for procuring and selling farm supplies or rendering services of pecuniary value to farmers or purchasing or otherwise acquiring on the same plan real property to be used as a club room or rest room or for entertainments and gatherings of a public nature may in the presence of a witness sign in duplicate and cause to be filed in the office of the registrar a memorandum of association in writing to which shall be attached an affidavit verifying the signatures."

It is also provided that any association which conducts a retail business and has a paid-up capital of at least five thousand dollars may by a resolution signed by three quarters of the registered shareholders provide that certain subsections of section 5 of the original Act shall not apply to the association. These subsections have to do with the power of the association to purchase and sell for cash and to pledge the credit of the association.

Section 8 of the original Act which provides that at least 75 per cent of the shareholders of every association shall be agriculturists has had added to it a proviso that this section shall not apply to associations incorporated only for the purpose of purchasing or otherwise acquiring on the co-operative plan property to be used as a club room or rest room or for entertainments and gatherings of a public nature.

AGRICULTURAL APPROPRIATIONS

	1921-22	1922-23
Assistance to General Agricultural Interests	$120,500	$117,000
Assistance to Live Stock Industry	50,600	62,300
Assistance to Dairy Industry	28,000	31,000
Publicity and Statistical Work	22,000	22,500
Improvement and Protection of Field Crops	303,500	41,500
Game Protection and Museum	37,300	35,300
Co-operation and Markets	19,000	22,000
Film and Stereopticon Service	12,000	...
	$592,900	$331,600

ALBERTA

Agricultural Societies.—An amendment to this ordinance provides for grants for ploughing matches to the extent of 60 per cent of the money paid out in prizes, up to $200.

Agricultural Pests.—This is an act providing machinery for the extermination of agricultural pests, passed particularly to deal with the grasshopper pest for 1922. The Act makes it compulsory for farmers to take steps to control pests on their farms, and makes provision whereby the municipal councils of every municipality must take effective measures to that end in the way of establishing mixing stations for poison bait, and regulating the distribution, which is done among the farmers at cost. Machinery is also provided for Government supervision of such campaign.

Co-operative Credit Societies.—An amendment to this ordinance provides terms under which residents in unorganized districts may form societies or become members of societies in organized territories.

Brand Act.—An amendment provides that the mark of any brand upon stock bearing the Government brand shall

not be any evidence of the ownership of such stock by the owner of the first-mentioned brand.

Dairymen's Act.—Amendments provide for the elimination of the system of cream-buying stations in Alberta. Following this, a system of government graders is to be established at creameries and control points.

Produce Merchants.—This is an Act providing for the licensing and regulation of produce merchants.

Hail Insurance.—Amendments to the Municipal Hail Insurance Act provide for the withdrawal from the operation of the Act of lands on which no crop return was made or hail tax levied. They also provide that the hail board may not make provision for the reserve fund if loss by hail in any one year is more than eight per cent of the total risk of that year.

Weeds.—An amendment to the Noxious Weeds Act provides that not more than $200 may be charged in any one year against any quarter section of land, in respect to services carried out under the Act.

Prairie Fires Ordinance.—Amendments provide more stringent regulations for combatting prairie fires, provide for fire guardian and chief fire inspector, and that members of all police forces and of rural councils shall be ex officio fire guardians. Provision is also made for commandeering the services of all men over 16 and under 65 to fight fires where necessary, and for the establishment of fire districts.

Provincial Relief Act.—Makes provision for extension of relief to farmers outside municipal districts and for taking mortgages as security.

Southern Alberta Relief Act.—This Act provides a partial moratorium for farmers residing in districts to be designated as drought areas, and provides for commissioners to supervise these districts. Provision is made in this Act that mortgages for debt for seed, twine, farm labour, food and clothing may be put on the crop not to exceed $500. In cases where security is seized, provision is made for exemption of sufficient to provide food and clothing for the farmer and his family until October, 1923. Provision is further made that consent of a judge must be obtained before legal proceedings are taken.

Municipal Districts Seed Grain Act.—Amendments provide that the limit of advance of seed grain per quarter section shall be $130 for 1922, limit to one person $260, and total limit for all advances against any quarter section $1,030.

Live Stock Inspection.—This is a new Act covering inspection of live stock in the province at public stockyards, abattoirs and elsewhere, which makes some improvements on the old Act.

Domestic Animals.—Amendments to the Domestic Animals Act provide more stringent regulations with respect to animals at large, makes provision for establishment of closed areas in extra municipal districts, and improves the provisions for impounding cattle.

AGRICULTURAL APPROPRIATIONS

Civil Government	$ 46,170
Income Account	848,480
Capital Account	951,200

Details of Income Account Expenditure

Grants to Exhibition Associations	$145,000
Judges at Agricultural Exhibitions	9,500
Institutes and Short Courses	18,500
Seed Fair	10,000
Livestock Encouragement Act	25,000
Destruction of Noxious Weeds	25,000
Stock Inspection	32,000
Publication of Official Brand Book	11,220
Administration of Stallion Act	9,000
Agricultural and other Statistics	7,000
Protection of Game	45,000
Promotion and Encouragement of Dairy Work	80,000
Schools of Agriculture and Farms	167,060
Natural History Museum	500
School Fairs and Grants to same	15,000
Prairie Fires Ordinance	44,000
Publicity Commissioner's Office	23,000
Poultry Marketing Service	19,000
Women's Institute and Grants	20,000
Miscellaneous Grants	18,700
Draft Horse Breeding	2,500
Immigration and Exhibits	5,000
Hay and Relief Work	30,000
Investigating conditions in Southern Alberta	10,000
Extermination of Agricultural Pests	12,000
Agricultural Agents	40,000
Operation and Equipment Farms at Ponoka and Oliver	25,500
To Encouarge Co-operative Marketing	10,000
Tree Planting and Horticulture	3,000
Contingencies	3,000
To provide for Bonuses	25,000

Details of Capital Account

Livestock Encouragement Act	$150,000
Equipment of Agricultural Schools and Farms	36,200
Promote and Encourage Dairy Work	10,000
Hay and Relief Work	170,000
Extermination of Agricultural Pests	62,000
Operation and Equipment Farms at Ponoka and Oliver	33,000
Dairy and Poultry Industry	500,000

MANITOBA AGRICULTURAL APPROPRIATIONS

	1920-21	1921-22
Salaries, Supplies and Expenses (Civil Government)	$ 18,600	$ 18,795
Agriculture	214,920	157,405
Manitoba Agricultural College	355,458	254,550
Agricultural Publications	23,500	16,525
Miscellaneous and Unforeseen	3,000	2,250
Birtle Demonstration Farm	5,670	4,254
Settlers' Animal Purchase Act	9,320	
Fire Relief	25,000	
Agricultural Survey	15,000	11,250
Marketing Investigation	1,000	1,926
Total	$671,468	$460,955

THREE-MONTH COURSES IN AGRICULTURE AND DOMESTIC SCIENCE

BY L. STEVENSON, B.S.A., ONTARIO DEPARTMENT OF AGRICULTURE

THE courses of instruction for Ontario farm boys and girls covering a period of three months as mentioned in the January issue of *The Agricultural Gazette*, terminated on March 3. The students, the instructors, the supervisors, and all others interested in the movement, expressed the one opinion that these schools were an unqualified success.

ATTENDANCE TABLE

Place	*Agriculture*		*Domestic Science*	
	On Roll	Average Daily Attendance	On Roll	Average Daily Attendance
Bolton	72	66	74	58
Waterdown	60	40	45	30
Strathroy	37	25	40	25
Wingham	37	30	31	26
Total	206	161	190	139

Seventeen specialists were on the staff of lecturers or demonstrators in the agricultural courses and eight specialists were employed for the domestic science courses. These twenty-five instructors moved from school to school in regular order, keeping up the maximum number of lecture periods at each. The school hours of 9 a.m. to 4 p.m. were maintained throughout the course. Examinations were given at the end of each lecture course and a certificate was granted to all students making the required grade. The county and township councils in the counties where the schools were held co-operated with the Department by way of supplying hall or lecture room space, heating, lighting, and grants for equipment and prizes. The officials of four counties in which the courses were held have expressed a keen desire to have them repeated in 1922-23. The four District Agriculturists that had immediate charge of these three-month courses have expressed a desire for their continuance within their respective counties, in preference to the one-month courses. The Department of Agriculture is making arrangements to conduct eight three-month courses in Agriculture and Domestic Science during the 1922-23 winter season.

PART III

Agricultural Education and Related Activities

RURAL LIFE AND ACTIVITIES FOR WOMEN

BY MISS ABBIE DELURY, DIRECTOR, HOME-MAKERS' DEPARTMENT, UNIVERSITY OF SASKATCHEWAN

THE greatest incentive to agricultural activity on the part of the individual farmer is removed if for any reason the homemaker fails in the performance of her duties or in the creating of a proper home atmosphere. This fact is recognized by the Departments of Agriculture in the different provinces of Canada and in the United States, also more recently in England and Wales, Scotland and Belgium.

The Rural Women's Organizations originated with the women as independent organizations depending on their own efforts; their work was recognized as such a great factor in the success of rural life, that now departments of agriculture initiate this work and give it financial aid as part of the work of the State. The Soldier Settlement Board also recognized this fact by the establishment of a Home Branch.

The Rural Homemaker's Drawbacks

The homemaker fails sometimes:

(1) Through lack of proper training and experience for her duties;

(2) In rural life, through discouragement, lack of incentive, monotony, overwork, need of change; hence acquires an unhealthy attitude of mind toward her duties;

(3) Because of a lack of home-making instincts, misfits.

How the Women's Organizations can help

The Womens' Organizations with the aid of the Department of Agriculture can help all these classes as well as the homemaker who has made a greater or less success of her work, and these are in the majority in our province. They can all be helped by the department through:

(1) Literature supplied from time to time as need arises;

(2) Extension lectures and demonstrations;

(3) Correspondence with clubs and with individuals;

(4) Conferences and conventions.

They can help one another in their organization (and this is the greatest good that arises from organization) by working together for common interests and by each giving the benefit of her knowledge and experience for the others. The discouraged woman who has come to look on her work as merely drudgery acquires this state of mind through living in isolation—she cannot see her work as an important part of a great whole.

The Work of Woman's Organization in the Community

When she finds herself working along with other women (1) to procure proper and sanitary school equipment, (2) to establish a hot and wholesome noon luncheon, (3) to have medical inspection of the schools, (4) to establish rest-rooms for the community, (5) to undertake the establishment of community halls for the use of their people, (6) to start or procure libraries for the public use, (7) to procure nursing help for the district, (8) to establish cottage

hospitals and help to maintain them, (9) to hold fairs of different kinds, (10) to have child welfare exhibits and instruction, (11) to assist the less fortunate, (12) to co-operate with and assist other organizations in their works, and (13), best and greatest of all, to create a better and healthier community spirit and to miminize the spirit of hatred, prejudice and intolerance of different kinds that disgrace our community and national life and to further in its stead a spirit of love and open-mindedness and an atmosphere of hospitality—then her work becomes elevated and transfigured in her mind and that is all that is necessary.

Overlapping

There are so many institutions organized for public welfare that the thought arises in the minds of many people that there must be much overlapping and therefore waste of time and material. Our department co-operates with every possible department in the province:

The Provincial Department of Health;
The Education Department in many lines;
The Agricultural Societies;
The Grain Growers;
The Red Cross;
Teachers;
Registered Nurses affiliated with the Provincial Council;
Staff of Department of Agriculture;
University Staff.

The Press

In this we have not found yet any danger of overlapping. The field is just beginning to be covered and there is more than enough for each organization to do. We believe that "all our strength lies in our union, all our danger lies in discord."

Education

It will be sufficient to touch upon two or three of the broader aspects of education as it affects rural life:

(1) There is the necessity of technical or practical education. There may be a danger of over-emphasizing certain phases of technical education as applied to agriculture and even homemaking. We must bear in mind first, last and always that the studies of agriculture and household science are primarily intended to broaden and balance the child's sphere of knowledge and experience and to open for him a wider field in his choice of life-work. It should not be the object of such training to make farmers or mechanics or dressmakers or cooks or homemakers. If so, we are in danger of producing many of the misfits I before referred to.

There is, perhaps, a danger also in this kind of education to place an undue value on the material and economic side of life to the exclusion of what may be called the cultural or spiritual side. It would seem that our civilization has run amuck through this same error.

Undoubtedly we have to give our attention to the material side but there is grave danger of blunting the delicate sensibilities of our children by giving too much prominence to such things. Present-day education calls for more cultivation of the finer sensibilities.

Good Literature in the Home

It has been felt at all times that our agricultural people are often placed at a disadvantage with the dwellers in cities on account of a lack of a certain kind of culture. This is not so true as it once was but is true to a certain extent. The means of much culture had always lain at their doors and has been ignored particularly in the last two or three generations. I refer to the reading of good literature in the homes. This is a practice that has gradually been dying out. One great reason for this is, perhaps, that we have been placing the responsibility for such things on our schools and educative institutions, just as parents have gradually been unloading many more of their responsibilities on these

same institutions, and therefore neglecting the true and natural source—the home. That is why homes are ceasing to be homes in the true sense of the word and are losing their hold on the youth of our time. Without home education all other forms of education must fail to a large extent because they can be, at best, only helps and extensions of the greater home education. The home is responsible for the time spent outside of school—for education and recreation during this time. There is no greater instrument for culture of heart and mind than a love of and familiarity with good literature.

Our Women's Organizations have been doing much to stimulate love of reading. Many of them have organized local libraries and put their communities in the way of getting circulating libraries. Our university gives a grant of dollar for dollar up to ten dollars spent for library books. This is a step in the right direction but the community library can never take the place of home reading and we are trying to make ourselves active in this direction. We have talked this matter over with our clubs for years, but sometimes some definite action is necessary to get a movement under way. For this reason, I should recommend that a yearly grant of ten dollars be given to each club to buy works of good literature for reading in the club and to be used in the homes—a selection could be made from headquarters if thought necessary.

Community Bird Clubs

We all realize, I believe, that the question of recreation and how time outside of school shall be spent is a bigger problem than ever it was before. The casting-off of the parent of this responsibility has given commercial interests their opportunity and they have seized it with a vengeance—so that now we are finding our people dependent on —not their homes or any inner resources which they themselves may have—but on those commercialized forms of amusement. What can be the outcome but a lowering of ideals and perversion of the best instincts. Our communities are so threatened now in this way that there is gradually growing up a feeling in our women's organizations that this is a problem that requires the co-operation of the men's organizations and there is a steady tendency towards community clubs. It is felt that we must do something better. It is with this in mind that the idea of the Community Bird Club came, and for these reasons:

(1) Bird study offers a source of personal happiness and a resource for enjoyment throughout life if begun in childhood.

(2) It fosters fine qualities of character—kindness, gentleness, sympathy, humaneness and a reverence for life as opposed to present-day tendencies toward selfishness, lack of thought for others, brutality and cruelty, and a callousness toward life.

(3) It affords a healthy form of recreation for mind and body.

(4) It opens up other fields of interest and can be made a sort of anchorage around which can be attached literature, music, scientific knowledge and much else.

(5) It can afford a common meeting-ground for men, women and children.

(6) It is a vital problem in agriculture as evidenced by the efforts put forth by our governments, provincial and federal. Their efforts will have to be largely unavailing if the interest and effort of the people is not forthcoming. The effort can be put upon the boys and girls. It will give them a sense of responsibility that will help to prepare them for the lives of citizens.

The Homemaker's Organization

The Homemaker's Organization can in no way be looked upon as a subsidized organization. True, they re-

ceive a money grant from the Department of Agriculture, but, it must be pointed out, this is to help in the interests of the Department of Agriculture. More than that, the women through their organizations, every year, return to the province in the form of expenditures for certain provincial and community needs, three or four times the amount of any grant received.

SCHOOL GARDENS AND HOME GARDENS

BY G. V. VAN TAUSK, M.A., B.Sc. (Oxon.) B.S.A.

IN discussing the relative merits of School gardens and Home projects the object to be attained has to be taken as the criterion of judgment.

Historically, the School garden is probably the oldest form of agricultural education, as the introduction of such plants antedates formal instruction either by books or in laboratory. The School garden in its modern sense, however, was not introduced as an educational factor until about a century ago in Germany. In Canada, while Round Hill, Annapolis County, and other places in Nova Scotia had successful school gardens as early as 1886, the real impetus to this mode of education was given by the McDonald movement. This movement had for its avowed aim "School gardens as a means of making nature study and elementary agriculture more concrete and valuable, as well as a means of enriching the aesthetic, moral and social training of the rural school." Generally speaking, the aim is the same to-day, whether in rural or urban centres or whether in Elementary or Secondary schools.

The purpose of this discussion is to find out whether the Home project will accomplish this aim and to what extent.

Home vs. School Gardens

From an educational point of view, both the School and Home gardens mean either the practical application of information obtained in the classroom or deductions made in the classroom from the information obtained in the garden. The first of these is the vocational and the second the cultural point of view. Modern educational practice does not draw hard and fast lines between these two educational aims and therefore instruction in gardening must have both a practical and cultural value. Education, however, to be really worth while, much reach the place where the training is to take root, and that place is the "home" and this is probably the foremost argument in favour of Home gardens.

In comparing the instructions and courses of study in Elementary Agriculture of the Canadian provinces and 16 of the American States (mainly central and N.W.) we find that the following eight aims are typical of all of them—

(1) To offer educational development to the pupil through agricultural (gardening) activities.

(2) To offer an opportunity for the correlation of the practical and theoretical.

(3) To motivize and vitalize the study of agriculture and nature study.

(4) To furnish an opportunity for remunerative activity.

(5) To develop manipulative skill.

(6) To develop a keener appreciation and the proper attitude toward nature and agriculture.

(7) To give the individual student an opportunity for individual development.

(8) To train vocationally (for farming or gardening).

It is the author's experience during 15 years teaching in the provinces of

Manitoba, Saskatchewan, Alberta, and the States of Iowa and North Dakota, that all these aims can be accomplished as well or better in connection with a home garden, than in a school garden.

Garden projects are of three types, (1) productive projects, in which the pupil's efforts result in material returns, like the raising of ¼ acre of potatoes; (2) improvement projects, like the beautifying of the home grounds, and (3) experimental projects, like growing small plots of inoculated and uninoculated alfalfa. It is only the third kind which adapts itself as well or better to school grounds than to home conditions, but even this is questionable, due to the usual neglect of school grounds during the holidays.

Projects may be of two kinds: school or group projects and individual projects. Group projects may be of any of the three types mentioned and are conducted while the school is in session for the purpose of demonstrating proper methods of work, and giving skill, but mainly for what may be properly termed outdoor laboratory exercises.

Individual projects, which are conducted on the home plot are preferable because—

(1) In the school garden a great deal of a great many pupils' time is taken up by observation and neither skill nor executive ability can be developed by being a mere spectator;

(2) The individual home project fits in very nicely with a pupil's usual home activities;

(3) Students are able to carry out their projects with the least inconvenience;

(4) They offer an opportunity for individual achievement;

(5) It is under actual home conditions and not specially favourable or adverse (as the case may be) school conditions, that gardening is carried on;

(6) There is no reason why students should not visit each other's projects and learn thereby;

(7) It forms the ideal contact between formal education as represented by the school and practical life as represented by the home.

Conclusion

Wherever properly conducted and looked after both during session and holidays, school gardens are of great educational importance, but Salzman's statement: "School gardens have been laid out neither to draw attention of the passers by, nor to give great returns, but to instruct," is as true to-day as it was in the middle of the 18th Century.

On the other hand, home projects have as much or more educational value as school gardens and in the majority of cases can be made to suit local conditions. It is pre-eminently a matter of applying scientific methods to home conditions, and to quote Huxley's favourite definition of science, which applies equally to home projects, "it is organized common sense."

THE SCHOOL GARDEN, WHERE?

BY FRED W. BATES, B A., M.Sc., DIRECTOR OF SCHOOL AGRICULTURE, SASKATCHEWAN

THE value of the garden as a definite phase of elementary school activity has been established beyond a doubt, but there is still room for discussion as to the form it should take in the various grades and where it should be located. Certain well defined principles are now generally accepted. The school garden is an educational, not a commercial project. It is a laboratory for the Nature Study and Agriculture of the school where control of natural processes may be observed at first hand and the inter-relationship of plant, insect and animal life noted. It should not be so large as to become burdensome, nor so small as to be trivial. The size of the garden and the character of the work must vary with the age and grade of the pupil. In Saskatchewan when the project is conducted under the direction of the school it is regarded as a school garden whether located on the school ground or elsewhere.

In the lower grades, accessibility is a determining factor and the garden should be on the school grounds or close thereto. On the other hand, in the upper grades, the character of the work is the most important factor, hence the garden should be placed where every condition will be most favourable to success. After trial for a number of years, we are convinced that in this province at least the most favourable place is at the home of the child. We are therefore developing as rapidly as we can the directed home garden for the older pupils and already find it one of the most popular and successful phases of our Boys' and Girls' projects.

PART IV

Special Contributions, Reports of Agricultural Organizations, Publications and Notes

RURAL CREDITS IN CANADA

AN interesting and instructive article on rural credits in Canada, by W. T. Jackman, Professor of Economics in the University of Toronto, was published recently in the International Review of Agricultural Economics. Professor Jackman was Chairman of the Commission appointed by the Ontario Government to investigate the problem of rural credits, and his special knowledge of the subject makes his article an authoritative one.

The following is a summary of Professor Jackman's article which he introduces in these words: "In the development of agriculture in Canada, a country which is predominantly agricultural, the same tendencies have been manifested as in most other countries; and as agriculture is becoming rapidly a business, involving the application of business principles and practices, it is necessary to provide for those engaged in it such facilities for borrowing as will enable them to have their credit requirements satisfied according to their needs. In all countries it is recognized that the commercial banking systems are not adapted to the special conditions of agriculture and, consequently, there have come into operation institutions for meeting these requirements for rural credit."

Manitoba.—The Rural Credits Act, 1917, with amendments, makes provision for the organization by farmers of rural credit societies through which they may obtain short term loans for productive purposes. Before commencing business the society must receive subscriptions to its capital stock from at least thirty-five persons actually engaged or agreeing to engage within one year in farming operations. Each member must subscribe for at least one share of stock and at least 10 per cent must be paid on all stock subscriptions before the society begins business. The Provincial Government and the municipality may subscribe each for one-half as much stock as the aggregate of the individual subscribers. The board of directors of a society is composed of nine members of which the secretary-treasurer is the only one paid.

Any member desiring a loan makes application to the secretary, stating the purpose of the loan and submitting a statement of his assets and liabilities. If his application is approved he is granted a line of credit for a year, and all the personal property he acquires through the proceeds of the loan is subject to a lien in favour of the society. The lender of the money has also the guarantee of the society. The rate of interest payable by the borrower must not exceed 7 per cent per annum.

The returns received from the investment of the paid up capital of the society, together with the society's share of the interest paid by its borrowers, must be used to pay necessary expenses, after which a dividend not to exceed 6 per cent per annum may be disbursed on the paid-up stock and the remainder transferred to a reserve fund.

Until March, 1920, the banks furnished the loans at 6 per cent, but when they decided to raise the interest to 6½

per cent the societies refused their demand. Legislation was then passed establishing the Provincial Savings Office which accepts deposits from all sources and pays 4 per cent interest. This system was inaugurated in July, 1920, and in March, 1921, the net amount of savings was over $2,000,000, so that its funds were expected to be sufficient to meet demands for loans.

Long-term or mortgage credit is provided in Manitoba through an Act passed in 1917 which created the Manitoba Farm Loans Association to act as the loaning agent between the Government and the farmers. The association is managed by a board of five members. The capital stock, $1,000,000, is divided into 200,000 shares of $5 each which can be owned only by borrowers and the Government of the province. Every borrower must subscribe and pay cash for shares to the extent of 5 per cent of the amount of his loan, and when the loan is paid back the borrower's shares are surrendered and paid off at par. All loans made by the association must be secured by a first mortgage and must be repaid on the amortization plan. All mortgages are taken for a thirty-year period, but a loan may be paid off at any annual payment date at or after the end of five years from the date of the mortgage. Loans must not be for more than $10,000, must not exceed 50 per cent of the value of the property mortgaged, and are made only for purposes specified in the Act. Funds for the loans were obtained by a contribution from the Provincial Treasury. In addition the Board may sell 5 per cent bonds up to 90 per cent of its first mortgages.

Saskatchewan.—There has been no legislation for the establishment of short-term credit in Saskatchewan. An Act passed in 1917 provides for long-term credits. It is practically similar to the Manitoba Act, the chief differences being: (1) No maximum was stated for any individual loan; (2) All the money for the board's purposes was to be provided by the Provincial Treasurer; (3) The first mortgages received by the board were to be handed over to the Provincial Treasurer as security for the loans.

Alberta.—Under the Live Stock Encouragement Act five or more farmers may form an association and apply to the Government for a loan to be used in purchasing cows and heifers, and, if desired, the joint purchase of a pure-bred bull, which must not cost more than 10 per cent of the loan. Each member of the association may borrow up to $500. The money is borrowed on the joint and several notes of the members, guaranteed by the Government.

Short-term credit is provided by the Co-operative Credit Act, 1917, which is very similar to the Rural Credits Act of Manitoba described above. The chief difference is that according to the Alberta Act the rate of interest to be paid by the borrower is not a fixed rate paid by all borrowers, but is decided by agreement between the society and the bank as lender.

In 1917 the Alberta Farm Loan Act, resembling the Manitoba Act except in minor details, was passed. It has not been put into operation.

British Columbia.—Under the Land Settlement and Development Act, 1917, the Land Settlement Board has been constituted. It receives advances from the Provincial Treasurer. The Board grants loans on the security of first mortgages, for any purpose which will maintain or increase agriculture or pastoral production. The minimum loan is $250 and the maximum $10,000, and must not be for more than 60 per cent of the value of the property mortgaged. The rate of interest on loans is arranged as nearly as possible by adding not over 1½ per cent to the rate paid by the Government.

Two kinds of loans are made under this Act: long-dated loans, extending for 15, 20 or 25 years, repayable on the

amortization principle, and short-dated loans, for not less than 3 or more than 10 years, repayable on such terms as the Board may think fit. A short-term loan must not exceed $5,000 except in special cases.

The Board has also the power to accept Crown lands or to buy land from private owners and develop it for agricultural purposes. It may establish "settlement areas" in undeveloped parts of the province. Finally, the Board is to take over the functions exercised by the Agricultural Credit Commission appointed under the Agricultural Act, 1915.

Ontario.—In 1916 an Act was passed authorizing loans to settlers in the newer portions of the province. The maximum amount loaned to any settler is $500 and the rate of interest is 6 per cent. The loan is registered and constitutes a lien against the land. The Co-operative Marketing Loan Act, passed in 1920, authorizes loans to co-operative associations engaged in cleaning, storing, and marketing seed and potatoes. The loan must not exceed $3,000 and must not be more than 50 per cent of the value of the property on which it is made. It is to be free of interest for two years and after that 6 per cent interest must be paid. At least 50 per cent must be repaid within five years, and the other 50 per cent within ten years from the date of the loan.

In 1920 the Government appointed a commission to investigate the problems of short-term and long-term credits. The report of the Commission was presented on October 15, 1920. An outline of its recommendations are given in Professor Jackman's article.

In April, 1921, the Agricultural Development Act and the Farm Loans Act were passed providing for the granting of long-term and short-term loans. The system for granting short-term loans is practically the same as that of Manitoba. The provision for long-term loans is virtually a duplication of that of the Manitoba Farm Loans System, except that (1) the Manitoba Farm Loans Association is replaced by an Agricultural Development Board of three members, (2) the Board will loan, under favourable conditions, up to 65 per cent of the value of the land and buildings, and (3) loans shall not be made for less than three or more than twenty years. In order to secure funds, the provincial treasurer is authorized to open offices in the province to receive deposits from any persons or corporations, and to pay interest on such deposits not exceeding 4 per cent.

Quebec.—The *Caisses Populaires,* organized under the Quebec Syndicates Act, provide assistance to farmers and others in the way of both short-term and long-term loans. Each of these banks is a separate entity and operates in a restricted locality. The loanable funds of a bank are obtained by receiving the deposits of the people in that section and by the sale of its shares. The value of each share is usually $5 and is payable in small instalments of a few cents each. The system is voluntary and members may withdraw their holdings at any time. The social importance of the system, especially in encouraging thrift, is made a paramount feature. Loans, if of small amounts, are made on the security of promissory notes, but all other loans are based on first mortgages. The larger proportion of the loans are from $5 to $200. Repayment is monthly. At least 10 per cent of the net profits is annually set aside as a reserve fund. Dividends may be paid to shareholders in proportion to the amount of fully-paid shares held.

New Brunswick.—"An Act to Encourage the Settlement of Farm Lands" was passed in 1912. Under it a board of three members is appointed to buy farms and resell them at cost to

settlers, and to administer a Government fund for this purpose. A catalogue of suitable farms is kept, and the settler is helped to make a choice. If the price to be paid for the property is less than $1,000 the purchaser must pay down 25 per cent; if the price is over that amount he must make an initial payment of 35 per cent. The balance, with interest at 5 per cent, is paid according to agreement, but the final payment must be made within ten years, except when the term is extended two more years by the Board.

In 1918 "An Act to Provide for the Purchase of Sheep" was passed, authorizing the Government to purchase breeding sheep and resell them to farmers in the province at cost.

Nova Scotia.—No provision has been made for short-term credits, but for mortgage credit "An Act for the Encouragement of Settlers on Farm Lands" was passed in 1912. The settler who wishes to borrow must have cash capital equal to 20 per cent of the appraised or purchase value of the land, besides what he would require for house furnishings, stock, etc. The loan may amount to 40 per cent, of the value of the property, and in approved cases to 80 per cent. The loan may be for as long as 30 years, with repayment on the amortizement plan. The mortgagor may pay off his indebtedness at any time within the period. The rate of interest varies from 6 to 7 per cent.

PROTECT THE BIRDS

BY L. STEVENSON, B.S.A.

OF what use in nature is this host of winged creatures that with the changing seasons sweeps over our land and sea? Birds are the most useful allies of man. If it were not for the work of birds in keeping insects in control, life would be intolerable and very hard for human beings and animals. If we remove the birds the insects would increase so rapidly as to destroy the food crops and vegetation of the country. The great increase in insect pests during the past twenty years has been directly due to the destruction of birds by man and his devices. Man has been the most destructive agent of bird life. In the past century many who are living to-day recollect the flights of passenger pigeons that obscured the sky, or remember seeing great flocks of partridges, quail, prairie chicken, and water fowl. Many birds common to our country fifty years ago are almost extinct now. The wild turkey, the snow goose and the passenger pigeon are gone, and many other food birds are becoming rarer each year. The smaller bird such as the robin, swallow, sparrow, and woodpeckers are becoming fewer and fewer each year, so much so that there are not sufficient to control the insects on which birds generally feed.

To effectually protect birds one must first understand the causes for the apparent decrease in numbers. Few wild birds die of old age or disease. The main causes of bird decrease is lack of food, the severity of climate, attacks of their enemies, and destruction of their nesting places and young.

During March of this year many migratory birds appeared before the settled warm weather came. These were subjected to wind and snowstorm, were forced to hunt for food during rough weather at a time when there is but little food. Numerous of these early migrants perished from cold and starvation. Food would have saved them. Now that man has destroyed the feeding grounds, with their fruitful wild berry bushes, weed seed patches and other bird food producing vegetation, there is but one thing for man to do, and that is

supply foods suitable and attractive to the early visitors, to protect them from storms, ignorant people, and stray cats and dogs. This can be done by building a small shelter in the back yard tree, and keeping a supply of bird foods, such as hemp seed, strips of pork rind, suet, dried berries, small seed of various kinds, broken grain, and apples. The planting of berry producing and seed producing bushes and trees in the door yard or field is a great aid to bird life. With the clearing of land for farm and building purposes the natural home of birds is destroyed, nesting trees and food trees are cut down and burned. Birds will not breed, if there is no nesting place. The best trees and shrubs to plant are those that offer resistance to cats and predatory boys. Thorn trees, thimble berry, wild rose bushes, mountain ash, Virginia creeper, mulberry, black cherry, flowering dogwood, red cedar, common juniper, and staghorn sumac, are all very desirable bird trees and shrubs. By supplying protection, birds are induced to stay in a locality, nest, and increase in numbers sufficient to destroy the insects, and the weed seeds on which they feed. The common practice of burning over grass areas during the spring season destroys thousands of bird nests in the vicinity of Toronto each year. This burning up of nests and young birds practised by thoughtless people should be prevented by law. It is treating the bird much as a human being is abused when his home is burned and his food crop destroyed.

The common pet cat generally succeeds in killing all the birds within its range. One cat in each block of residential property will keep the bird population down to vanishing point. Banish the cats, both stray, pet, and exhibition that birds may live and continue to do their work. Cats destroy more bird life than all other animal enemies combined. Feeding places safe from cats can be erected above ground, or enclosures of wire netting can be made in which birds can feed in safety. The wire netting should be open enough to permit the free passage of the birds and small enough to keep out cats. A few shrubs or brush placed around such an enclosure makes it more attractive to the birds.

Providing suitable nesting boxes is a splendid practice in bird protection. The nearer the nest box is an imitation of nature, the more useful it will be. Birds like the swifts and swallows which frequent buildings will nest in the fancy structures resembling miniature houses. Woodpeckers, wrens and blue birds require an entirely different type of nesting place, so does the robin and the oriole. Study the birds that you desire to serve and prepare the nest box being guided by nature. Birds are attracted by food in the same way that any other creature is attracted. Plant sunflowers and japanese millet in the back yard, or set apart a portion of the garden for the growing of feed for the small birds that work for you protecting your food crops and your homes from insects during the entire season. Build a bird shelf outside a window of your house. You need the pleasure and community of interest to be had in thus catering to the wants of birds. Teach the children to watch for and feed them, and thus benefit both the child and the bird. A few chickadees or grosbeaks, or nuthatches or downy woodpeckers kept about the house during the winter give pleasure to all, and every rural home can have such if protection and food are supplied.

BEES MAY NO LONGER BE IMPORTED FROM EUROPE

According to an order of the Dominion Minister of Agriculture, dated April 22, 1922, the importation into Canada of bees, used or second hand hives, or raw hive goods or products, excepting honey and wax, from the continent of Europe, is prohibited on and after the first day of May, 1922. This restriction is necessary owing to the danger of introducing a contagious disease of bees known as "Isle of Wight" disease.

EXPORT FEE FOR FOXES

Export of foxes to the United States involves an examination of each fox and a certificate by one of the Veterinary Pathologists of the Health of Animals Branch, Department of Agriculture.

A fee of $5 will be required for each fox examined and certified for export.

NEWS ITEMS AND NOTES

According to a statement made in the House by the Dominion Minister of Agriculture, Honourable W. R. Motherwell, the Seed Grain Purchasing Commission, by storing an extra supply of Western Canada oats, has been able to provide over 300,000 bushels of seed oats for the Maritime Provinces and places east of Ottawa this year. The Minister said that but for this supply becoming available, he did not know where the much required seed oats would have been obtained. Mr. Motherwell intimated that the Seed Purchasing Commission, which, it might be remarked, has proved self-supporting, would continue its activities.

In connection with the regulation of the Dominion Minister of Agriculture prohibiting the importation of bees from Europe for fear of introducing the "Isle of Wight" disease, it may be stated that, according to British investigations, this is one of the most serious diseases known to bee culture. When once firmly established, it quickly exterminates a colony. For many years its cause was unknown. Studies by Doctors Rennie and White and Elsie J. Harvey of Great Britain, discovered the primary cause to be a parasite or a "mite," *tarsonemus Woodi*. The parasite is said to attack the bees through the breathing orifices, and, in well established cases of infection, to extend inward on either side from the thoracic spiracle.

It appears that the parasite may be found in apparently normal or healthy bees. Bees carrying mites will go to the fields and function apparently as well as healthy bees, but as the parasite begins to develop, the first symptom in their "host" or victim is inability to fly, although apparently normal in other respects. After a time it joins other affected bees in front of the entrance to the hive, and there dies. It is confidently expected that the embargo against the importation of bees from European countries into Canada, now in effect, will prevent this serious malady from reaching this country.

The Dominion Minister of Agriculture has restored the privilege of having seed tested at the government laboratories free of charge to the extent of ten samples from each applicant. This free privilege covers a period extending from the first day of May in one year to the last day of January in the succeeding year. During the months of February, March and April a fee of fifty cents for each test will continue to be made owing to the congestion that usually occurs at that period due to the testing of trade samples, and samples submitted by seed inspectors under the Seed Control Act.

Laboratories for seed investigation, conducted by the Seed Branch of the Dominion Department of Agriculture, are established at Ottawa, Winnipeg and Calgary, but there

are also district inspectors having headquarters at Truro, N.S., for the Maritime Provinces, at Quebec city for Quebec Province, and at Toronto for Western Ontario; Ottawa serves for Eastern Ontario, Winnipeg for Manitoba and Saskatchewan, and Calgary for Alberta and British Columbia.

The Canadian Representatives at the International Conference of World Agriculturists held at Rome in May last were, Dr. A. T. Charron, M.A., D.Sc., Chief Chemist and Director of the Dairy School of the Province of Quebec at St. Hyacinthe, Quebec, and W. E. Wilson, formerly Provincial Dairy Commissioner for the Province of Saskatchewan.

The conference, which comprises delegates from some sixty countries adhering to the International Institute of Agriculture, meets every second year in convention to discuss agricultural problems and devise means for their solution.

The progress that is being made in the accrediting of dairy herds is evidenced by the fact that in less than two years since the work was begun, 250 herds have been tested. Speaking at a gathering of stockmen recently, the Deputy Minister of Agriculture, Dr. Grisdale, gave it as his opinion that in a comparatively short time every herd of any consequence in the country would be on the accredited list.

The Dairy and Cold Storage Commissioner, Mr. J. A. Ruddick, states that much unwarranted prejudice exists in the public mind towards cold storage. If the quality of certain food appears to have deteriorated, there is frequently a declaration that it has suffered from cold storage. Of course there may be some reason in the supposition, but experiments have abundantly proven that if a substance is placed in cold storage in a fit and wholesome condition, provided the temperature is kept right, it will remain in that condition for a great length of time.

Cold storage in a commercial way leads to and maintains a well-balanced state of supply. It enables unseasonable goods to be placed on the table in seasonable condition. It permits goods to be shipped for long distances. It enables districts that cannot produce certain lines of food to enjoy the lines produced in other and possibly far off districts and climes. In short cold storage has become indispensable to modern life, and while it may at times lend itself to certain abuses, these are not such as cannot be regulated.

While in other countries cold storage on a large scale had years before become a recognized factor in the meat business, it was not until 1894 that the first warehouse with mechanical refrigerating machinery was established in Canada. This occurred in Montreal, and gave an immense impetus to the system. Prior to that there were a few small warehouses in which the cooling process was confined to gathered ice, and where the storage was of a very limited nature. A quarter of a century later, or in 1919, according to data furnished by the Commissioner Ruddick, there had been 266 installations of mechanical refrigeration in cold storage warehouses, abattoirs and other manufacturing establishments; 9 warehouses equipped with the gravity brine system, and 47 small freezers, mostly for fish, where ice and salt were used as a refrigerant; altogether a total refrigerating space of 33,247,774 cubic feet. During the past two years further additions have been made, and now Montreal through its harbour commission, has on the verge of completion the largest, best equipped, and most up-to-date cold storage warehouse extant.

A bulletin entitled "Bran, Shorts, Middlings, and Feed Flour," recently issued by the Department of Agriculture, Ottawa, will be of considerable interest to farmers and stock raisers who require to purchase milling by-products. The publication referred to has been based on investigations resulting from recent demands on the part of many Canadian live stock associations for feeds of a more uniform and higher standard, as well as of greater suitability, especially for the feeding of young stock. These demands were particularly in connection with feeds composed of wheat by-products. In order to better determine the direction the investigation should take, joint meetings were held of millers' associations and representatives from the Seed Branch and the Experimental Farms Branch of the Dominion Department of Agriculture. Many samples were carefully examined by the Division of Chemistry and the Seed Branch, and the outcome of this work and the recommendations based thereon are included in the bulletin.

It is expected that the Argentine will become an increasingly large exporter of dairy products. Previous to 1914 the surplus of butter for export from that country was never more than about ten million pounds annually, the major portion going to the United Kingdom. In 1916, exports began to increase, and during the eleven months ended November 30, 1921, 41,518,512 pounds of Argentine butter were received into the United Kingdom. Considerable quantities were also shipped to other countries, including Canada. It was considered probable that the exports of butter from that country might revert to pre-war quantities after the stimulus of high prices had disappeared, but information

received by the Department of Trade and Commerce is to the effect that exports are likely to be maintained or even increased this year.

On April 21, 1922, the Destructive Insect and Pest Act Advisory Board was constituted by Order in Council. The present members are: Mr. Arthur Gibson, Dominion Entomologist, Chairman; Mr. E. S. Archibald, Director of the Experimental Farms, Vice-Chairman; Dr. J. H. Grisdale, Deputy Minister of Agriculture, Dr. H. T. Gussow, Dominion Botanist, and Mr. L. S. McLaine, Chief, Division of Foreign Pests Suppression, Secretary. The Board will supervise the carrying out of the regulations under the Destructive Insect and Pest Act, and will also recommend from time to time such changes or additions to the regulations as may be deemed necessary.

The Dominion Entomologist reports the opening of the European Corn Borer Laboratory at Port Stanley for the summer. Investigations will be continued on the life history and control of the pest. Reports received indicate that during the past winter the mortality rate of the hibernating larvæ did not exceed eight per cent. An extensive experiment, which includes a number of farms, on the control of this insect is being carried on.

Two crews of eighteen men each are now working on Pike Mountain and in the Voght valley on the Bark Beetle control work in British Columbia. A third crew has been established on the Coutlee plateau.

The Brown Tail Moth work in Nova Scotia was completed for the season on March 31. A total of 979 nests were collected during the winter as compared with 530 collected during the preceding year.

A meeting of the Northwest International Committee of Farm Pests was held at Minot, N.D., on April 11 and 12. A number of important problems were discussed relating to insects of international importance, such as Grasshoppers, the Pale Western Cutworm, and the Wheat Stem Sawfly, with a view to arriving at definite conclusions. The Committee decided to carry out a number of uniform experiments and appointed sub-committees to arrange the details. It was decided to hold the 1923 meeting at Winnipeg, Man. Mr. Criddle was re-elected Chairman and Mr. Mitchener of the Manitoba Agricultural College, Secretary.

A temporary laboratory for the investigation of the mosquito has been established at Banff, Alta., where Mr. Eric Hearle, who for some time past has been studying the problem, will have his headquarters.

Co-workers and friends on the staff of the Experimental Farms Branch made a suitable presentation to Dr. Chas. E. Saunders on the eve of his retirement after twenty years of service.

Mr. C. W. Baxter, who resigned recently as Director of the Dominion Fruit Branch to engage in commercial work, was the recipient of a handsome silver tea service presented by his staff as a token of remembrance and good will.

An arrangement whereby the horticultural work of the Ontario Department of Agriculture will be consolidated at the Ontario Agricultural College, Guelph, has recently been announced. The consolidation will embrace the Fruit Branch, the vegetable specialist's work, the Vineland experimental station, and the College horticultural department. The staff at Vineland and other places will interchange with the horticultural officials at Guelph, and vice versa, for lecturing and research purposes, and the findings from experiments conducted at various places will be co-ordinated. In this way much overlapping, it is hoped, will be averted and the work improved generally.

On May 11 and 13 the Ontario Department of Agriculture broadcasted two lectures by radio telephony to farmers and others within a radius of 150 miles of Toronto. The first address to be sent was given by the Hon. Manning Doherty, Minister of Agriculture, and the second by Mr. L. Stevenson, Secretary and Supervising Director. It is believed that this was the first occasion on which radio telephony was employed in Canada by a government department or institution for the distribution of information of special interest to farmers. The possibilities of assisting the farming community through official radio publicity are great, and their recognition by the Ontario Department marks the opening of a new era.

The closing exercises of the Ontario Veterinary College were held on Thursday, April 29. The chair was occupied by Principal C. D. McGilvray. The degree of Bachelor of Veterinary Science, which is conferred by the University of Toronto, was granted to six graduating students. The present graduating class holds the unique position of being the last to graduate from the College at Toronto owing to the fact that the institution is being removed to Guelph.

Mr. A. T. Charron, formerly Assistant Dominion Chemist and now Superintendent of the Provincial Dairy School, has been selected to represent Canadian chemists at the International Convention of Chemists to be held this summer at Lyon, France.

The Commission of Agricultural Merit of the Province of Quebec met recently to discuss plans for increasing the interest taken in the Agricultural Merit competitions.

The Quebec government has granted a diploma of Very High Special Merit in the Order of Agricultural Merit to Mr. Auguste Dupuis, fruit grower of Village-des-Aulnaies. Mr. Dupuis is the second person in the province to receive the title under the law passed in 1920. During his career he has served the public in a number of capacities. In 1880 he was appointed Dominion commissioner of the Jamaica exposition. In 1900 he was made secretary of the Canadian Commission at the World's Fair, Paris, France, and later was entrusted with similar duties at the St. Louis exposition, St. Louis, Mo. At the present time Mr. Dupuis is one of the directors of the Pomological Association of the province, and is chief director of the fruit growing stations. From 1907 to 1921 he was a member of the Council of Agriculture.

The same distinction was at the time granted to Dr. J. C. Chapais, who has long been prominent in connection with agricultural affairs in the province. Dr. Chapais was one of the editors of the Journal d'Agriculture, and for a number of years lectured and wrote on agricultural topics, being the author of several pamphlets and also of work on forestry. He is assistant commissioner of dairying in Quebec; assistant commissioner for that province under the Agricultural Instruction Act; has acted as president of the Fruit Growing and Pomological Association, and was secretary of the first Forestry Association in the province. In 1919 a degree of Doctor of Agriculture was conferred on him by the Laval University.

Mr. George Bouchard, M.P., was recently appointed a member of the Council of Agriculture for the province of Quebec. Mr. Bouchard, who is Professor of Botany and Zoology at the College of Agriculture, Ste. Anne de la Pocatiere, has been active for a number of years in agricultural circles in the province of Quebec as a writer, lecturer and organizer. In 1922 he visited the Canadian West, in company with a professor of Oka and Dr. A. T. Charron, and reported to the provincial Minister of Agriculture on the organization of agricultural teaching in the other provinces of Canada.

At the closing exercises of the Manitoba Agricultural College the announcement was made that a roll of honour of persons who have distinguished themselves in the development of agriculture in Manitoba was being compiled, and that pictures of those included in the roll will be hung in the halls of the Agricultural College buildings. Illuminated addresses were presented by R. M. Matheson, Brandon, to the first four to be placed on the roll, following their introduction by President John Bracken. The recipients were: Dr. S. A. Bedford, Weeds Commissioner, who was commended for wise and sympathetic leadership in the early days of agriculture; A. P. Stevenson, fruit grower of Morden; Gen. Hugh N. Dyer, Minnedosa, for contribution to agricultural education, and J. W. Scallion, Virden, for organization work among farmers of the province.

The farm survey organized by the Animal Husbandry Department of the University of British Columbia in 1920 will be continued this year. The cost is being met by the Agricultural Instruction grant and the work will be continued for a period of years. It is the intention to definitely establish, among other things, the reasons why some farmers fail and others succeed under circumstances that are exactly similar. Deductions indicate that the matter of management is often the determining factor. Surveys of this nature are regarded by the College of Agriculture as a necessary basis for teaching and extension work.

A scholarship in Horticulture has been established at the University of British Columbia by the British Columbia Fruit Growers' Association. The scholarship has an annual value of $100, and is awarded to the student in horticulture attaining the highest rank in the entire work of the third year and will take the fourth year in this subject. Last year no award was made. This year two men have qualified and will each receive a scholarship.

The animal husbandry students at Macdonald College successfully conducted a Live Stock Show and Sale of their own, on the lines of the "Little Nationals," featured during the past few years at some of the American colleges. The event took the form of a sale in the morning and a show in the afternoon.

The Superintendent of Elementary Agricultural Education reports an increase in home project work this year in the Province of New Brunswick. Three thousand more packages of seed, including potatoes, have been distributed than in 1921. Eggs distributed for poultry projects increased from 1,000 to 1,260 settings.

Two Live Stock Improvement Trains were operated in the Province of Manitoba during May. Cattle and hogs were featured and pure bred bulls were carried for sale. Other features were a lecture car for women and one for boys and girls.

An Agricultural Instruction Train to tour the Province of Quebec is being organized. The train will be furnished and operated by the Canadian Pacific Railway, while the equipment and live stock will be provided jointly by the Provincial Department of Agriculture and Macdonald College.

The extension department of the Saskatchewan College of Agriculture conducted ninety-nine local short courses in agriculture during the winter months each lasting from one to three days. Educational films were shown at the evening lectures. The total attendance was 18,877, the average per meeting being 74.

An important conference was held recently in Saskatchewan between representatives of the produce dealers, freight and expresss agents, the Retail Merchants' Association, and the Poultry Breeders' Association for the purpose of discussing the handling of eggs and the means whereby loss in shipping might be reduced.

Ninety Boys' and Girls' Club demonstration teams have been organized in Manitoba this year. Some 38 different subjects are being treated.

The agricultural schools at Gleichen and Youngstown, Alberta, have been temporarily closed. The attendance at these schools is the smallest of any of the six farm schools in the province. The teachers will be placed in other schools and the pupils given free transportation to the nearest school.

The College of Agriculture of the University of Alberta held its first annual Live Stock Feeders' Day in April last. It is intended to make this gathering an annual event, with the object of placing the results of the feeding tests conducted by the department of Animal Husbandry directly before farmers engaged in the feeding of live stock.

In 1920 the Dominion Bureau of Statistics commenced the annual collection of returns from fur traders, and for the season 1920-21 the value of pelts purchased from trappers and fur farmers was $10,151,594. In 1921 the value of raw furs exported was $11,711,981.

As settlement has extended, the numbers of wild fur-bearing animals have decreased, and this has led to the breeding of fur-bearing animals in captivity. Success has already been attained in the raising of the fox, mink, skunk and raccoon. Experiments are being made with the marten, fisher, beaver, muskrat, and opossum. Karakul sheep, from the young of which is obtained the valuable fur known as Persian lamb, are also being successfully raised in Canada. The total value of pelts sold from fur farms in Canada in 1920 was $388,335, comprising $373,140 for silver fox pelts, $11,111 for patch fox, $3,349 for red fox, and $735 for mink. The value of live animals sold from fur farms in the same year was $763,221, comprising—$750,123 for silver foxes, $12,095 for patch foxes, $818 for red foxes, $150 for mink and $35 for raccoons. The value of live foxes exported from Canada in 1921 was $277,182.

Fur trading led to the early colonization of Canada. The first explorers returning to the old world carried with them the pelts of fur-bearing animals obtained from Indian trappers, and the desire to gain control of this trade led to the formation of companies and associations which, in return for certain privileges in connection with the trade, agreed to promote colonization in the new country. The first company chartered to trade in furs was formed by a number of merchants of France in 1603. The first trading post was established at Hochelaga in 1611. Exploration of the northern and western parts of Canada showed that the territory abounded in wild life, and in 1670 an English company—the Hudson's Bay Company—was chartered to trade in furs, and built its first trading post on Hudson Bay. Other posts were soon erected and their establishment was continued until their locations extended from the Atlantic to the Pacific. The first Canadian company to trade in furs was formed by a number of Montreal merchants in 1783. In 1821 all fur trading companies of British North America were united under the Hudson's Bay Company.

Raw furs are the chief commercial product of the wild life of Canada, and as such represent the only economic return from hundreds of thousands of square miles, constituting perhaps half the area of the Dominion.

On the basis of present statistics it would appear that fully 60% of our total hog production is consumed in Canada, the other 40% being exported. If 22% of our hogs are of select bacon type it follows that 45 to 50% of our exports of bacon are the product of off-type bacon hogs, without allowing for the fact that the entire 60% of the pork used in Canada is not entirely of off-type bacon hogs. The Canadian trade is undoubtedly supplied with a percentage of pork from bacon hogs so that the percentage of low grade Wiltshires exported is well over 50% of the total. This largely accounts for the fact that during 1921 and up to the present time there has been a spread of 30 shillings per long hundred between Canadian and Danish bacon.

Attention is drawn to a bulletin entitled, *Success in Prairie Tree Planting*, issued by

the Forestry Branch of the Department of the Interior. This publication presents the results of the co-operative tree planting plan, established about twenty years ago by the Dominion Government in order to assist prairie farmers in protecting their farm buildings and gardens by shelter-belts of those kinds of trees which tests have proved to be suitable. The stopping of soil drifting by wind-breaks is also dealt with. An estimate is made of the cash value of the sixty million trees sent out from the Dominion Government nursery stations, but the greater value is found in the increased comfort and homelike surroundings of prairie homesteads since the plan was inaugurated. In the pamphlet forty farmers, scattered over the prairies from Winnipeg to Calgary, tell of their success under the plan. While the free distribution of trees under this system is confined to the Prairie Provinces, the work affects the whole of Canada both because improved conditions in one part must benefit all Canada, and because it shows that if trees of valuable kinds can be got to grow in what was once considered a treeless region, a great opportunity exists for improving forest conditions and in growing timber in all parts of Canada.

The production of apples in the United States in 1919, according to the Fourteenth Census, was 136,746,154 bushels, as compared with 145,412,318 bushels in 1909, representing a decrease of 8,666,164 bushels, or 6 per cent. The average production per tree was 1·2 bushels in 1919, as compared with 1 bushel in 1909.

The number of apple trees of bearing age in 1920 was 115,265,029, as compared with 151,322,840 in 1910, representing a decrease of 36,057,811 trees, or 23·8 per cent.

The number of apple trees not of bearing age reported for 1920 was 36,171,604, as compared with 65,791,848 in 1910. These figures indicate a decrease of 29,620,244 trees, or 45 per cent.

The production of peaches in 1919 was 51,551,251 bushels, as against 35,470,276 bushels in 1909. The increase in production between 1909 and 1919 amounted to 16,080,975 bushels, or 45·3 per cent. The average production per tree in 1919 was 0·8 bushel, as compared with 0·4 bushel in 1909.

The number of peach trees of bearing age in 1920 was 65,654,921, as compared with 94,506,657 in 1910, representing a decrease of 28,851,736 trees, or 30·5 per cent.

APPOINTMENTS AND STAFF CHANGES

Mr. C. W. Baxter has resigned as Dominion Fruit Commissioner, to which position he was appointed in November, 1918, to become general manager of the Niagara Peninsula Growers, Limited. Since assuming the duties of Commissioner, Mr. Baxter has been active in securing the adoption of more specific grades for fruit, in the standardization of packages, and in preparing for the compulsory grading of potatoes and onions. Under his direction the inspection and market reporting services have been extended and developed, transportation problems have been given special consideration, and the Canadian Horticultural Council has been organized for the consolidation and general welfare of horticultural and allied interests.

The resignation is announced of Mr. Charles E. Saunders, B.A., Ph.D., LL.D., Dominion Cerealist. Dr. Saunders was appointed in 1903, and since that time has been engaged in breeding and testing wheat, oats and other grains. Dr. Saunders has to his credit the discovery and introduction of Marquis wheat, and the origination of a number of other outstanding varieties. Of Marquis wheat, which was first distributed in 1909, over three hundred million bushels were produced on this continent in 1918. His more recent introductions include Prelude, Ruby, and Early Red Fife wheats, and the Liberty (hulless) oat.

Mr. J. R. Hastings has resigned the position of District Fruit Inspector for Western Ontario, to become Secretary-Treasurer and Assistant General Manager of the Niagara Peninsula Growers, Limited.

Mr. F. C. Bailey, B.S.A., has been appointed Superintendent of the Dominion Experimental Farm, Fredericton, N.B., to fill the vacancy caused by the resignation of Mr. W. W. Hubbard. Mr. Bailey formerly held the position of Assistant Deputy Minister and afterwards that of Commissioner of Agriculture in the Ontario Department of Agriculture, and more recently that of manager of the Royal Agricultural Winter Fair, from which he resigned in March last.

Mr. Arthur Kelsall has been appointed entomologist at Annapolis Royal, N.S., in place of Mr. George E. Sanders recently resigned.

Veterinary Inspector W. W. Stork is in charge of the Inspection Station at Niagara, Ontario.

Veterinary Inspector W. Moynihan is Acting District Inspector for Ontario.

Mr. Archibald H. McLennan, B.S.A., who for several years has been vegetable and potato specialist in the Department of Agriculture of Ontario, has been appointed to the position of professor of horticulture at the Ontario Agricultural College to succeed Professor J. W. Crow, whose resignation took place recently.

Mr. W. J. Sheppard has been appointed Provincial Apiarist for British Columbia. Mr. . Sheppard was an inspector of apiaries for eight years, and for the past three years held the office of Chief Inspector.

Obituary

The Health of Animals Branch lost one of the oldest members of its staff by the death, in March last, of Dr. J. A. Couture, D.V.S., after a long and honourable career. Born in 1850, Dr. Couture was one of the first graduates of the Montreal Veterinary College. He entered the Department in 1884, and held the position of Superintendent of the Animal Quarantine Station at Levis, Quebec, where his vigilance prevented on more than one occasion the entry of serious contagious diseases into Canada. Dr. Couture was greatly interested in the improvement of the French-Canadian breeds of horses and cattle, and assisted in securing the establishment of records for those breeds.

NEW PUBLICATIONS

DOMINION DEPARTMENT OF AGRICULTURE

Experimental Farm, Brandon, Man., 1921.—Interim Report of the Superintendent, W. C. McKillican, B.S.A.—Dominion Experimental Farms.

Experimental Station, Charlottetown, P.E.I., 1921.—Interim Report of the Superintendent, J. A. Clark, B.S.A.—Dominion Experimental Farms.

Results of Experiments at Fort Vermilion, Alta.—Bulletin No. 6—New Series. Compiled from the Annual Detailed Reports of the Superintendent, Robert Jones.—Dominion Experimental Farms.

Why and How to Use Cheese.—Pamphlet No. 7—New Series. By Helen G. Campbell, Dairy and Cold Storage Branch.

The Best Varieties of Grain.—Pamphlet No. 11—New Series. By Charles E. Saunders, B.A., Ph.D., LL.D., Dominion Cerealist.

The Strawberry Root Weevil.—With notes on other Insects affecting Strawberries. By W. Downes, Assistant Entomologist, Pamphlet No. 5—New Series.

The Western Wheat-Stem Sawfly and Its Control.—By Norman Criddle, Entomologist in charge for Manitoba. Pamphlet No. 6—New Series.

Field Crop Insects.—By H. F. Hudson, Assistant Entomologist Division of Field Crop and Garden Insects, Entomological Branch. Circular No. 2.

ONTARIO

Agricultural and Experimental Union, 1921.—Forty-third Annual Report.

Twenty-first Annual Report of the Agricultural Societies and of the Convention of the Association of Fairs and Exhibitions, 1921.

Milk Production Costs.—Bulletin 284. By the Ontario Cost of Milk Production Committee.

Addresses on Co-operative Marketing.—By Mr. Aaron Sapiro, San Francisco, California.

The Cabbage Maggot.—Circular No. 40. By L. Caesar, Provincial Entomologist, O.A.C., Guelph.

BRITISH COLUMBIA

British Columbia Dairymen's Association.—Sixteenth Annual Report, 1921.

MISCELLANEOUS

Success in Prairie Tree Planting.—By Norman M. Ross, B.S.A., B.F.—Bulletien No. 72, Forestry Branch, Department of the Interior.

Grain Trade of Canada, 1921.—Report for the Crop Year ended August 31 and to the close of Navigation.

ASSOCIATIONS AND SOCIETIES

Canadian Horticultural Council.—At the organization of the Canadian Horticultural Council, held in Ottawa on May 17, representatives were present of the various associated horticultural interests. A constitution and by-laws were adopted. The objects of the association as set forth in the constitution are to promote the advancement of matters tending towards the improvement of the horticultural and allied industries in Canada, including plant origination and registration, production, grading, packing, transportation, storage, marketing, etc.

The interests concerned are to be represented as follows: Fruit growers 5, vegetable growers 4, wholesale fruit and vegetable dealers 2, and one each for the package manufacturers, florists and gardeners, jam manufacturers, canners, nurserymen, amateur horticulturists, and seedsmen.

As far as possible, all of these representatives shall be appointed by the associations of the industries concerned. The geographical distribution of fruit growers provides for one member each for Nova Scotia; New Brunswick and Prince Edward Island combined; Quebec; Ontario; and one for the Prairie Provinces and British Columbia combined. The vegetable growers' representatives shall be similarly distributed. with the exception that there is but one representative for the three Maritime Provinces.

It was announced at the meeting that the Dominion Government would provide $5,000 for organization purposes. The funds for future work will be levied on the various industries concerned on the following basis: Representatives of fruit-growers' and vegetable-growers' organizations, 50 cents each. The following interests, as a whole, will each contribute an annual lump sum fee: Package manufacturers, $500; florists and gardeners, $200; nurserymen, $200; wholesale fruit and vegetable dealers, $1,000; jam manufacturers, $500; canners, $500; horticultural associations, $200; seedsmen, $200. Any person is entitled to associate membership in the Council by paying an annual fee of $5.

A resolution was adopted by the Council recommending that the administration of the laws governing the adulteration of jams, fruit beverages, etc., be transferred from the Department of Health to the Department of Agriculture.

The following officers were elected: President, Col. H. L. Roberts, Grimsby, Ont.; Vice-president, F. W. Bishop, Kentville, N.S.; Second Vice-president, R. R. Scott, Winnipeg, Man. Directors: W. E. Groves, Hamilton Ont.; W. H. Stewart, Aylmer, Que.; Jas. Wagstaffe, Hamilton, Ont.; Chairman of Standing Committee: Publicity, E. B. Luke, Montreal, Que.; Legislation, C. W. Baxter, Fruit Commissioner, Ottawa; Transportation, G. E. McIntosh, Fruit Branch, Ottawa; Plant Registration, W. T. Macoun, Dominion Horticulturist, Ottawa; Secretary-Treasurer, L. F. Burrows, Assistant Fruit Commissioner, Ottawa.

Alberta Shorthorn Breeders' Association.—Hon. President, Hon. George Hoadley, Minister of Agriculture, Edmonton; Hon. Vice-President, R. S. Hamer, Ottawa, Ont.; President, W. L. Carlyle, Calgary; 1st Vice-President, Wm. Sharpe, Lacombe; 2nd Vice-President, H. Wright, Calgary; Secretary-Treasurer, W. A. McMasters, Calgary.

Alberta Clydesdale Horse Breeders' Association.—President, Norman A. Weir, Ohaton; 1st Vice-President, A. Dollar, High River; 2nd Vice-President, Thos. McMillan, Okotoks; Secretary-Treasurer, E. D. Adams, Calgary.

Alberta Horse Breeders' Association.—Hon. President, Hon. George Hoadley, Minister of Agriculture, Edmonton; President, E. D. Adams, Calgary; 1st Vice-President, W. L. Carlyle, Calgary; 2nd Vice-President, Norman A. Weir, Ohaton.

Alberta Swine Breeders' Association.—President, G. F. Herbert, Medicine Hat; 1st Vice-President, W. J. Hoover, Bittern Lake; 2nd Vice-President, F. W. Gardner, Delacour.

Alberta Aberdeen-Angus Breeders' Association.—Hon. President, Professor, A. A. Dowell, Edmonton; President, F. R. Cathro, Calgary; 1st Vice-President, C. H. Richardson, Bowden; 2nd Vice-President, A. E. Noad, Olds; Secretary, C. E. Morrison.

Alberta Technical Agriculturists' Association.—President, D. H. Galbraith, Vulcan; Vice-President, Professor G. Cutler, Edmonton; Secretary, C. E. Bain, Calgary.

British Columbia Stock Breeders' Association.—Hon. Presidents, Hon. S. F. Tolmie, Victoria; Capt. J. C. Dunwaters; President, Alex. Davie, Ladner; Vice-President, Frank L. Ward, Douglas Lake.

Ontario Poultry Producers' Association.—President, Lewis N. Clark, Port Hope; Secretary, George W. Miller, Toronto; Treasurer, E. L. Ruddy, Toronto.

Royal Agricultural Winter Fair.—President, W. A. Dryden, Brooklin, Ont.; Vice-President, H. C. Cox, Toronto; Secretary-Treasurer, A. P. Westervelt, Toronto.

Eastern Canada Live Stock Union.—President, C. W. Gurney, Paris; Vice-President, S. E. Todd, Toronto; Secretary-Treasurer, J. D. Brien.

THE LIBRARY

LIST OF PRINCIPAL ACCESSIONS TO THE DEPARTMENTAL LIBRARY, INTERNATIONAL INSTITUTE BRANCH, DEPARTMENT OF AGRICULTURE.

Les Coleopteres d'Europe: France et regions voisines, par Professeur C. Houlbert. Paris, Librairie Octave Doin, 1922. Tomes 1-3.

Neighborhood entertainments, by Renee B. Stern. Toronto, Macmillan co. of Canada, 1919. 297 pp. il. (The young farmer's practical library).

Dictionary of botanical equivalents; French-English, German-English, by Ernst Arschwager and E. M. Smiley. Baltimore, Williams & Wilkins co., 1921. 137 pp.

The book of ice cream, by W. W. Fisk. Toronto, Macmillan co. of Canada, 1919. 302 pp. il. (Rural text-book series).

A compendium of food-microscopy with sections on drugs, water, and tobacco, by E. G. Clayton. London, Bailliere, Tindall & Cox, 1909. 431 pp. il.

Horses, asses, zebras, and mules, by W. B. Tegetmeier, and C. L. Sutherland. London, Horace Cox, 1895. 158 pp. il.

The friendly Arctic, by Vilhjalmur Stefansson. Toronto, Macmillan co. of Canada, 1921. 784 pp. il.

Policing the plains, by R. G. Macbeth. Toronto, Hodder & Stoughton, 1922. 320 pp. il.

Selected readings in international trade and tariff problems, by F. W. Taussig. New York, Ginn & co. 1921. 566 pp.

The vitamines, by Casimir Funk. Baltimore, Williams & Wilkins co. 1922. 502 pp. il.

The vitamins, by H. C. Sherman. New York, Chemical catalog co. 1922. 273 pp.

Elements of the science of nutrition, by Graham Lusk. Philadelphia, W. B. Saunders co. 1921. 541 pp. il.

Microscopy of technical products, by T. F. Hanausek, tr. by A. L. Winton. New York, John Wiley & sons, 1907. 471 pp. il.

Insect behavior, by P. G. Howes. Boston, R. G. Badger, 1919. 176 pp. il.

Measuring minds; an examiner's manual to accompany the Myers mental measure, by C. E. Myers and G. C. Myers. New York, Newson & co. 1920. 88 pp. il.

Cyclopedia of farm crops, by L. H. Bailey. Toronto, Macmillan co. of Canada, 1922. 699 pp. il.

The apple tree, by L. H. Bailey. Toronto, Macmillan co. of Canada, 1922. 117 pp. il.

Fruit growing, by B. W. Douglass. Indianapolis, Bobbs-Merrill co. 1922. 357 pp. il.

Farm & garden rule book, by L. H. Bailey. Toronto, Macmillan co. of Canada, 1917. 587 pp. il.

How to know the mosses, by E. M. Dunham. New York, Houghton Mifflin co. 1916. 287 pp. il.

Gardening, by A. B. Stout. Yonkers-on-Hudson, World book co. 1922. 354 pp. il.

The home beautiful. Monroe, Mich. Greening nursery co. 1921. 114 pp. il.

The book of the peony, by Mrs. E. Harding. Philadelphia, Lippincott, 1917. 259 pp. il.

Report of the international potato conference, 1921. London, 1921. 182 pp.

Methods of teaching vocational agriculture in secondary schools, by S. H. Dadisman. Boston, R. G. Badger, 1921. 142 pp. il.

The story of the agricultural club, 1918-1921, by R. H. Rew. London, P. S. King & son, 1922. 205 pp.

Community life and civic problems, by H. C. Hill. Boston, Ginn & co. 1922. 561 pp. il.

Consumers' co-operative societies, by Charles Gide. Manchester, Co-operative union, ltd. 1921. 251 pp.

Elementary community civics, by R. O. Hughes. Boston, Allyn & Bacon, 1922. 475 pp. il.

Fernwood community center, by J. W. Tavenner. Boston, Roxburgh publishing co. 1921. 233 pp.

An agricultural atlas of Wales, by J. P. Howell. Prepared for the Institute for research in agricultural economics, Oxford. Southampton, 1921.

Authors' and printers' dictionary, by F. H. Collins. New York, Humphrey Milford, 1921. 408 pp.

The microscope, by Conrad Beck. London, R. & J. Beck, ltd. 1921. 144 pp. il.

Insects and human welfare, by C. T. Brues. Cambridge, Harvard University press, 1920. 104 pp. il.

The early embryology of the chick, by B. M. Patten. Philadelphia, P. Blakiston's son & co. 1920. 167 pp. il.

Motion pictures for community needs, by Gladys and Henry Bollman. New York, Henry Holt & co. 1922. 298 pp.

Experimental cottages, by W. K. Jaggard. London, H.M. Stationery office, 1921. 77 pp. i.

Home nursing, by Sister Matilda. Toronto, Thos. Nelson & sons, 1919. 124 pp. il.

The psychic life of insects, by E. L. Bouvier, tr. by L. O. Howard. New York, The Century co. 1922. 377 pp.

Ramassage et utilisation des dechets et residus, by Arturo Bruttini. Rome. Institut international d'agriculture, 1922. 336 pp.

Hybrides, hybridite, et hybridation dans le regne animal, par. F. X. Lesbre. Lyon, A. Rey, 1921. 87 pp.

The principles of horticulture, by W. M. Webb. London, Blackie & son, ltd. 1907. 136 pp. il.

Geologie agricole du Departement de l'Oise, par Pierre Waguet. Beauvais, Institut agricole. 105 pp.

Country life leadership, by B. C. Davis, LL.D. Plainfield, N. J. 158 pp.

Fibres for fabrics, by A. E. Garrett. London, Hodder & Stoughton, 220 pp. il.

The home doctoring of goats, rabbits & poultry, by R. E. Davies. London, Benn bros. ltd. 1921. 54 pp..

How to study birds, by H. K. Job. Toronto, Macmillan co. of Canada, 1922. 272 pp. il.

The sport of bird study, by H. K. Job. Toronto, Macmillan co. of Canada, 1922. 312 pp. il.

Les engrais, par A. Ch. Girard. France, Librairie agricole de la maison rustique, 1922. 164 pp.

Farmer's account book. Dublin, Dept. of agriculture & technical instruction, 1921.

La race bovine charollaise, par Jacques Meniaud. Macon, France, 1921. 39 pp. ill.

The Province of Quebec; geographical and social studies, by J. C. Sutherland. Montreal, Renouf publishing co. 1922. 157 pp.

Botany, developmental and descriptive, by W. Mansfield. New York, Lea & Febiger, 1922. 232 pp. il.

The lychee and lungan, by G. W. Groff. New York, O. Judd co. 1921. 188 pp. il.

Gardening with brains, by H. T. Finck. New York, Harper & bros. 1922. 270 pp.

The story of the fields, by J. H. Fabre. Toronto, Hodder & Stoughton ltd. 271 pp. il.

Prairie dairying with cow-sense, by C. E. Thomas. Lloydminster, Sask., 1921. 38 pp.

Pumping and water power, by F. A. Bradley. New York, Spon & Chamberlain, 1912. 119 pp. il.

Cotton & wool, by J. S. M. Ward. London, William Rider & son, 1921. 270 pp.

Practical tanning, by Allen Rogers. New York, H. C. Baird & co. 1922. 699 pp. il.

Plane surveying, by J. K. Finch. Chicago, American technical society, 1920. 256 pp. il.

Modern painters' cyclopedia, by F. Maire. Chicago, F. J. Drake & co. 1918. 464 pp. il.

Household textiles, by C. M. Gibbs. Boston, Whitcomb & Barrows, 1922. 256 pp. il.

The concrete engineer's handbook. Scranton, International textbook co. 1922. 368 pp. il.

A naturalist in the Great Lakes region, by E. R. Downing. Chicago, University of Chicago press, 1922. 328 pp. il.

Food and cookery for the sick and convalescent, by F. M. Farmer. Boston, Little, Brown & co. 1917. 305 pp. il.

School & home cooking, by C. G. Greer. Boston, Allyn & Bacon, 1920. 554 pp. il.

Hope Farm notes, by H. W. Collingwood. New York, Harcourt, Brace & co. 1921. 234 pp.

Successful teaching in rural schools, by M. S. Pittman. New York, American Book co. 1922. 294 pp. il.

Prairie farmers' poultry book, by William Osburn. Chicago, Prairie farmer publishing co. 1922. 243 pp. il.

Farm animals, by E. W. Wilcox. Garden City, N.Y. Doubleday, Page & Co. 1915. 357 pp. il.

Alimentation rationnelle des animaux domestiques, par Raoul Gouin. Paris, Librairie J. B. Bailliere et fils, 1922. 404 pp.

The minds and manners of wild animals, by W. T. Hornaday. New York, Charles Scribner's sons, 1922. 328 pp. il.

Every step in beekeeping, by B. W. Douglass. Indianapolis, Bobbs-Merrill co. 1921. 177 pp. il.

Heredity and environment in the development of men, by E. W. Conklin. Princeton, University press, 1922. 379 pp. il.

Modern road building and maintenance, by A. P. Anderson. Chicago, Hercules powder co. 146 pp. il.

The "know how" of concreting, by H. C. Campbell. Newhawka, Neb. Sheldon Mfg. co. 1921. 127 pp. il.

Concrete bridges, culverts and sewers, by A. A. Houghton. New York, N. W. Henley publishing co. 1912. 58 pp. il.

The pocket book of refrigeration and ice-making, by A. J. Wallis-Tayler. London, Crosby Lockwood & son, 1919. 215 pp.

Sanitary refrigeration and ice-making, by J.J. Cosgrove. Pittsburgh, Standard sanitary manufacturing co. 1914. 331 pp. il.

Fundamentals in poultry breeding, by J. H. Robinson. Quincy, Ill. Reliable poultry journal publishing co. 1921. 160 pp. il.

Simple farm accounts, by R. E. Willard, Fargo, N.D. 1922. 106 pp.

Chemistry, by M. H. Kessel. New York, Globe book co. 1921. 109 pp. il.

Role des colloides chez les etres vivants, par Auguste Lumiere. Paris, Masson & cie. 1921. 310 pp. il. col. plates. Bibl. pp. 154-283.

Les maladies parasitaires des plantes (infestation—infection) par M. Nicolle et J. Magrou (de l'Institut Pasteur). Paris, Masson & cie. 1922. 199 pp.

The pigeon, by A. V. Meersch. Syracuse, C. C. De Puy, 1907. 64 pp. il.

Les recreations de l'apiculteur, par E. Alphandery. Montfavet, Librairie de vulgarisation apicole, 1921. 205 pp. il.

PART V

The International Institute of Agriculture

FOREIGN AGRICULTURAL INTELLIGENCE

All communications in regard to this section should be addressed to T. K. Doherty, International Institute Commissioner, Department of Agriculture, West Block, Ottawa.

SCIENCE AND PRACTICE OF AGRICULTURE

GENERAL INFORMATION

593.—**Food Ration and Vitamines.**—Desgrez, A., and Bierry, H., in the *Comptes rendus des séances de l'Académie des Sciences*, Vol. 172, No. 17, pp. 1068-1071. Paris, April 25, 1921.

On a previous occasion the authors investigated the specific food requirements of the organism, and basing their experiments on the indispensable factor of nitrogen balance they first inquired within what limits isodynamic nutritive principles could replace one another without injury to the organism, that is to say be physiologically equivalent.

Experiments on rats placed on synthetic diets deficient in vitamines showed that nitrogen equilibrium could be ensured, for a certain time, by fixed proportions of proteins, sugars and fats, in a given ration of sufficient energy value; that the minimum of each of the three elements depends on the chemical structure and the proportion of the two others; and, lastly, that the minimum of nitrogen is reached when a high percentage of a carbo hydrate is present in the ration.

What happens to an animal receiving a well balanced ration when one of the constituent elements of that ration is suppressed, while the percentage of the two others, or of one of them only, is raised in parallel in proportion to the calorific power? This was the question which the authors investigated in the further experiments dealt with in this paper.

Comparing these experiments with those of MacCollum and Davis, Drummond and Hindhede it appears that, on the one hand, with food deprived of fat, containing only albumins and carbohydrates, but rich in vitamines, the growth of the young animal and equilibrium of the adult can be assured, and that, on the other hand, in avitaminosis (lack of vitamines), the nitrogen balance can only be maintained if the constituents of the ration are all present in certain proportions in the diet.

It must, then, be admitted that the quantities of the complimentary factors A (fat soluble), B (water soluble) and C (antiscorbutic) required by the organism, vary not only with the kinds of food, but also with the proportions of these kinds present in the ration; it must equally be admitted that each kind of food exercises a functional role, in the chemical sense of the word, in the intermediate metabolism of the two others.

Already the fact that no substitution can exist between carbo-hydrates and fats, compared with the same albumen, and that the catabolism of certain aminic acids and fatty acids (cetogenic) is regulated by the sugars, indicated the importance of the chemical function and structure of the food. As the splitting-up of the proteins, sugars and fats comprise simultaneous phenomena, giving rise to products reacting on one another, it must be admitted that if, by the contribution of nourishment, these combinations are ensured, the reserves enter little or not at all into action. Different processes probably result, brought into action by the organism; some of which require the more or less essential assistance of vitamines.

CROPS AND CULTIVATION

801.—**The Physical Chemistry of Basic Slag.**—Desch, C. H., in *The Chemical News*, Vol. 122, No. 3177, pp. 102-103. London, March 11, 1921.

Complete physico-chemical knowledge of basic slag, is still lacking, in spite of the many excellent researches made regarding it. Chemical analysis has, indeed, given the proportions of oxides of the metals and metalloids contained in it, and the sulphur content is also known, but there are many discrepancies regarding the nature of the phosphates and silicates and also, among the minor constituents, regarding that of the sulphides. The fact that perfect crystals have been isolated gives no assurance that they are identical with the ordinary constituents of the mass of the slag or that they

are substances that are mineralogically homogeneous.

The essential constituents of basic slag are the oxides of iron, manganese, calcium, magnesium, silicon and phosphorus, whilst the sulphides of calcium and manganese and the fluoride of calcium should be considered as accessory; a state of oxidation only is considered although the iron may be found both in a ferric and ferrous state.

In basic slags containing more than 40% of lime, the latter is found chiefly in the form of orthosilicate (Ca_2SiO_4) which may produce by excessive fusion, glass, in which are incorporated small crystals of phosphoric mineral; and this structure complicates the determination of the constitution of the slags. Regarding phosphorus, it should be remembered that anhydrous phosphates of iron (ferrous or ferric) that are stable at high temperatures are unknown on the contrary for calcium phosphates. Be that as it may, many writers have shown that the silico-phosphates are the principal constituents of phosphatic basic slags.

The first of these compounds has been described by Carnot (1883; formula $Ca_3(PO_4)_2$, Ca_2SiO_4); Stead and Risdale next described crystals of another compound containing phosphate and silicate (1887; formula $4Ca_3(PO_4)_2$, Ca_3SiO_5); other similar compounds were also described and in 1911, Kroll added to them another Thomasite ($Ca_3(PO_4)_2$, $3CaO.\ Ca_2SiO_4$). Previously (1883) Hilgenstock had described the tetraphosphate ($4\ CaO.\ P_2O_5$), which had long been considered as the essential component of agricultural slags, but it is no longer probable that the silico-phosphates are most valuable for that purpose. Generally all the compounds are described externally, but little is known of their mineralogical individuality. It should be remembered that, as a rule, in these compounds calcium may be replaced more or less by iron or other metals, and that slags can be found with such an analysis that they will come under the formula of Thomasite. It does not follow that these slags should be considered as individualized compounds, but rather as entectic mixtures simulating pure crystals; the fact that phosphorus can pass in solid solution in silicates of iron should not be overlooked. A micrographic examination of the surface generally gives more information than the examination of sections, although the use of polarized light on the latter may be a good way to identify the minerals.

The sulphides enter into solid solution, but not to any extent; they remain partly in the form of insoluble globules. The fluorides are combined with phosphates to form minerals of the apatite class, which is the reason for the non-assimilability of fluoriferous slags.

This is about all that can be really definitely said regarding the constitution of basic slag and further research is absolutely necessary.

804.—**On the Fertilizing Action of Sulphur.**—CHAUZIT, J., in the *Comptes rendus des Seances de l'Academie d'Agriculture de France*, Vol. VII, No. 21, pp. 492-493. Paris, June 1, 1921.

After many years of experiment the author thinks it possible to draw a certain number of conclusions with regard to the use of sulphur as a fertilizing agent.

(1) Sulphur distributed in cultivated soil has a very distinct action, shown by an increase of the crop, varying according to the greater or less quantity of organic matter existing in the soil, extent of surface in contact and the greater or less time of contact.

(2) The action is proportional to the quantity of sulphur used, a quantity which apparently should be fixed, economically and practically, between 400 and 600 kg. per hectare (360 and 535 lbs. per acre).

(3) The sulphur should be applied as long as possible before the period during which the plants have an intense need of nutritive elements. In other words the sulphur should be applied in the autumn or the beginning of winter and with it should be dug in farm-yard, or other organic manures, whereas, in the case of application early in the autumn (with farmyard manure) 200 kg. of sulphur per hectare (180 lbs. per acre) gives good results, the quantity should be raised to 400 kg. (360 lbs. per acre) when manuring is done in winter.

(4) The effects noticed (increase of crop, more healthy plants, greater resistance to drought, decrease or disappearance of certain diseases), are due to the fact that sulphur sets free and renders assimilable the nutritive elements in the organic matter and certain mineral matters (potash) of the soil.

604.—**A Critical Study of Pot Fertilizer Experiments.**—LIPMAN, C. B., and LINHART, G. A., in the *Chemical News and Journal of Physical Science*, Vol. 122, No. 3180, pp. 137-138. London, March 24, 1921.

Waynick, Sharp and Lipman had already demonstrated that owing to the great variability of soils and of plants, fertilizing experiments of long duration cannot be of much practical value, if the factors of variation and probable error are ignored.

For this reason, Lipman and Waynick began, in January, 1919, a systematic study by statistical methods of the results of the pot fertilizer experiments carried out at the Ohio and the Pennsylvania Agricultural Experiment Stations.

Since the work would possibly be some time in the press, the authors deemed it wise to present a few of their most important conclusions. They draw attention to the fact that the originators of the experiments saw the value of replicating check pots, but did not recognize the importance of such replication for the fertilized pots, which renders it difficult to subject their data to statistical treatment. Fortunately, however, the long series of years during which the pots were studied gives a replication of each kind.

The authors arranged the data respecting the experiment pots into 8 groups according to the fertilizer; then they studied the effect of the fertilizer on each crop in the rotation, although they consider that the rotation study included in these experiments, which were themselves expensive, inadequate, and fallacious, only served to complicate a situation which was already sufficiently difficult.

The data from the pot experiments at the Ohio Station, when worked out according to the statistical method showed that:

(1) The "one-element" fertilizers produced no significant increases in yield over the yields obtained from the check plots. All statements to the contrary must be regarded as erroneous.

(2) The "two-element" fertilizers gave definite increases in yield over the check plots; but whether the increases are profit-yielding still remains to be determined.

(3) The same may be said for the "three-element" fertilizers.

(4) Different combinations of the same fertilizing element seem to have produced no difference in the results.

(5) The amount of fertilizer used seems likewise to have been without significance.

(6) Even when fertilizer experiments are properly planned, and the results adequately studied by statistical methods, our present knowledge of the enormous variability of all soils and plants renders the data from any given fertilizer plot of value only on that plot. This important consideration renders it highly probable that no fertilizer experiment as ordinarily conducted is possessed of sufficient practical value to justify the large expenditure of money, time and energy involved.

Having delivered themselves of this very severe criticism, the authors declare that they are not desirous of making a fetish of the application of statistical study to fertilizer experiments, but wish to show that if statistical methods are not applicable to the evaluation of fertilizer experiments, the latter must be accounted of even less value and significance than the authors have accorded to them.

608.—Are Vitamines Necessary for the Growth of Plants?—LUMIÉRE, A., in the *Comptes Rendus de l'Académie des Sciences* Vol. 171, No. 4, pp. 271-273. Paris, July 26, 1920.

Certain biologists have maintained that vitamines are necessary for the growth of plants (Bottomley, *Proceedings of the Royal Society of London, Biological Science*, 1914, p. 237; Moctheridge, *Ibid.*, 1917, p. 508; Agulhon and Legroux, *Comptes rendus de l'Académie des Sciences*, vol. 167, 1918, p. 597; Linossier, *Comptes rendus de la société de biologie*, April 1919, and March 1920) and this opinion, generally admitted moreover is derived from experiments of which the author by no means contests the results, but the interpretation of which does not seem to agree either with other facts or with the numerous tests made by him personally in this field.

Not only can certain micro-organisms and fungi be cultivated in chemically definite media without any trace of vitamines, but it is also possible to ensure the growth and complete development of higher plants with nutrient solutions which are purely inorganic. Mazé (*Annales de l'Institut Pasteur*, March 1919, p. 139) has shown that maize can accomplish its complete evolution in a liquid containing 15 elements, all organic matter being excluded. It is hardly conceivable that certain plants, ranging from micro-organisms up to the most complex plants, can live and grow in mineral media, while others require vitamines for their development. The idea of the utility of vitamines in the cultivation of mushrooms is due to the fact that the authors who have upheld that thesis have used very poor, insufficient media, such as a mixture of ammonium tartrate and glycerine the addition to which of a few drops of an infusion of raisins will considerably improve the nutritive value of the broth.

If the minute quantity of material thus added includes vitamines, it also contains salts, proteins, carbohydrates, and it seems improper to conclude, *a priori*, that the effect noted is due to one rather than to others of these substances. The author has stated that a great number of definite chemical products, inorganic, and organic used in minute proportions, would give the same results as those obtained by the addition of the infusion of raisins, and sometimes they even gave better results; all these substances cannot be considered as vitamines.

Beer yeast heated to 135° C. for one hour, that is to say, which has lost all its anti-scorbutic properties, can be used to prepare broths which favour considerably the growth of mushrooms grown in poor solutions having for basis ammonium tartrate and glycerine.

By methodically exhausting the yeast with alcohol, or by precipitating its extracts with phosphotungstic acid, the isolation of the vitaminic principles can be arrived at and it is thus possible to obtain, on the one hand, the exhausted yeast having no longer any curative effect on avitaminosis and, on the other hand, an extract containing the active vitamines; the latter, evaporated and then mixed with water does not improve the nutritive properties of suitable artificial media; it is sometimes rather injurious to growth, whilst the decoction of the residual yeast heated to 135° C. and deprived of its vitamines by this treatment can confer qualities which allow of a slightly more abundant growth.

By filtering organic liquids through fullers' earth to remove the vitamines, it is found that the filtrate deprived of these substances is more favourable to the growth of mildews than the liquid before its filtration.

Finally the author satisfied himself that organic extracts also, heated to about 250° C. up to the point of carbonization, preserved their fertilizing properties when they were added to a tartro-glycerin medium, and it is difficult to admit, in this case also, that the vitamines were able to withstand this temperature.

Vitamines are substances indispensable to life, which cannot be replaced by definite chemical compounds, precipitable by phosphotungstic acid and the reagents of the alkaloids; they are retained by filtration through fullers' earth and are destroyed by heat. Now, none of these properties is found in the substances which are capable of improving the nutritive qualities of poor media for plants. Therefore it does not seem proper to compare these substances with vitamines of which they do not possess any of the characteristic properties.

616.—The French National Wheat Committee.—HITIER, H., in the *Comptes Rendus de l'Academie d'Agriculture de France*, Vol. VII, No. 4, pp. 77-83. Paris, Jan. 26, 1921.

In April 1920, M. J. H. Ricard, the French Minister for Agriculture, instituted the National Wheat Committee with the general object of examining all means tending to increase the production of wheat and proposing all measures likely to insure their application.

The author reviews the results obtained in 1920 by the National Wheat Committee, through the work of its sections:—*Technique, competitions, corporate action and propaganda.* Departmental Committees, in collaboration with Directors of the Agricultural Services, Offices and Agricultural Associations, organized seed fairs, sorting sheds, wheat growing competitions, etc. Up to the present, the results satisfy the object aimed at by the creation of the National Committee and there is every reason to predict that its scope will be still further widened during 1921.

To this end, M. Rabaté (General Secretary of the Committee) presented to the Committee, on December 18, 1920, a programme of work which was approved and, among other things, has in view the following measures:—

A general enquiry regarding the present adaptation of various varieties of wheat to the geological, agricultural and climatic conditions of various parts of France. Study of the tillage of fields under wheat and subjecting to regular controlled experiments the operations at present recommended, not always with sufficient discernment and knowledge of the very varied conditions of Agriculture in France. Cultivation of wheat in spaced lines with second ploughing, earthing-up, etc. Multiplication of wheat competitions in the different Departments. Development of the co-operative societies for agricultural tools, apparatus for threshing and sorting seeds, and more especially a new form of association, namely, co-operative seed production, grouping 10, 20, 30 of the leading farmers of each canton, having at its disposal a genealogical selection farm and a central depot for sorting and despatch. By means of control over standing wheat crops and over threshing it would be possible to deliver one or two varieties with a maximum guarantee.

M. Chasles, President of the French National Association of millers has initiated an organization of this kind in the Seine-et-Marne district.

In all parts of France progress in the cultivation of wheat can be made, but to obtain results quickly, efforts must be brought to bear on those parts which cultivate the largest areas under wheat, because they possess land suitable to the crop; and it is necessary, in the whole of those regions, to endeavour especially to improve the cultivation in those which give the smallest yields. M. Rabaté has compiled an interesting table dealing with this point. After having determined the average figures of areas in hectares and of yield in quintals for the period 1905-1914, he calculated for each Department the coefficient obtained by dividing the number of thousands of hectares sown with wheat by the yield per hectare. The higher the coefficient so obtained, the greater is the relative effort of improvement required.

631.—The Production of Tea and the Tea Trade Throughout the World, the Improvement of Old Tea Estates and Soil Treatment on Plantations.—I. JUDGE, A. S., The Production of Tea in the Empire and Its Relation to the Tea Trade of the World, *Bulletin of the Imperial Institute*, vol. XVIII, No. 4, pp. 490-523. London,

Oct.-Dec. 1920. II. McKay, J. M., Improvement of Old Tea Estates, in *Tropical Life*, Vol. XVII, No. 4, pp. 57-59. London, April, 1921. III. Hope, G. D., Notice sur la preparation du sol pour la culture du the, *Bulletin Economique de l'Indo-chine*, Year 23, No. 145, pp. 814-820. Hanoi-Haiphong, Nov.-Dec. 1920.

I. As it is of great importance at the present time that the position of the tea trade in the world should be stated and explained, the author, lately Chief Collector of Customs in Burma, here gives a summary of the prevailing conditions in each country concerned with the production of tea. (pp. 717-725, International Review of The Science and Practice of Agriculture, June, 1921).

727.—**The Cultivation of the Vine in Italy During the Last Fifty Years.** Scano, G., in the *Giornale vinicolo italiano*, Year 47, No. 22, pp. 211-212. Casale Monferrato, May 29, 1921.

In the quinquennium 1870-1874 vines were grown in Italy on 4,620,000 acres, and from 1915 to 1919 on 10,745,000 acres, an increase of 6,125,000 acres.

In most of the regions the area under vines has more than doubled, in some (the Marches and Umbria) they have quadrupled; in Emilia it has become 5 times as large. Only in 4 regions (the Abruzzi and Molise, Basilicata, Calabria, Sicily) has there been a decrease. The increase of area under vines has taken place mainly in the North and Central regions of Italy, whilst there has been a decrease, really very slight, in Southern Italy.

LIVE STOCK AND BREEDING

642.—**The Value of Arsenical Dips as Remedies Against Scab in Domestic Animals in the Colonies.**—Velu, H. (vétérinaire de première classe), in *La Colonisation francaise au Maroc*, Year II, No. 15, pp. 4-5. Casablanca, Jan. 8, 1921.

The author states that no simple and practical treatment of scab capable of application on a large scale in the Colonies, requiring neither expensive plant such as sulphur fumigating chambers or dipping tanks, nor considerable manual labour under careful supervision, by a staff without any technical knowledge, has yet been devised.

The foreign literature, however, is very rich in publications on sulphur and arsenical dips and numerous formulae have been recommended. In 1915, in South Africa, Bedford tested 18 dips prepared extemporaneously (formulae or specialties) against scab in sheep; all except one proved efficacious and cured the scab by two minutes immersion repeated at intervals of 9 days.

The author tested one of these specifics, probably an arsenical cresyl, "Cooper's Fluid," well known to breeders in South Africa, Australia and even in Madagascar. The results obtained with this product in the treatment of scab in pigs were perfect; four dippings of about two minutes, repeated at intervals of 7 days sufficed to cure the diseased animals; "Cooper's Fluid" also proved a quick and easy remedy against sarcoptic scab of horses imported into Morocco after the war.

The method was as follows:—When the 150 sick horses arrived at the hospital a small tank was made in 24 hours by building a cement wall 20 cm. in height; 200 litres of antiseptic solution were got ready of a strength of 15%. The horses were led into the tank and douched by means of a spraying pump furnished with a long tube and a Vermorel jet-nozzle; a spraying nozzle was too easily obstructed and the liquid did not penetrate sufficiently. Each day the liquid which had been used was put back, filtered through gauze. To prevent the dip getting too weak and to replace loss, 100 litres of freshly prepared solution were added each morning. In this way 25 horses were treated a day (a number which might easily have been doubled), the douche was repeated once a week and the total number of douches was 3 or 4. Although this process only permits of a restricted number of animals being treated daily, it is, however, very simple, the cost is very small and it can be employed anywhere, being sufficient for the treatment of sick horses in a military post of several hundred of horses or in breeding farms, where the stock never exceeds 1,000 head.

The author also explains that this process has the great merit of avoiding the usual disadvantages of dips for destroying parasites, such as variations in the concentration of the dip, errors in strength and above all, the decomposition of sodium arsenite. Most of the dips used in South Africa, including Cooper's Fluid contain sodium arsenite and not arsenious acid or arseniate of soda as do the French dips and it is, perhaps, to this fact that they owe their destructive power on parasites and their being less poisonous; the efficiency of these dips is further increased by the addition of an emulsion to wet the tissues.

The author further explains the composition and preparation of two other dips used in English-speaking countries and which have been employed up to date only as remedies against ectoparasites in cattle, namely Chaplin's sulphur solution recommended by the Bureau of Animal Industry, Washington, and Watkins-Pitchford's arsenical solution which ought to be tried in the treatment of scab in horses. These solutions are composed and prepared as follows:—

I.—Chaplin's Sulphur Solution.—Take 8 pounds of quick lime or 10½ lb. of slaked lime, 18 lb. of sublimed or powdered sulphur, 10 gallons of water. Stir and keep boiling for an hour. Then add water to bring the volume up to 10 gallons. Dilute when required for use in the proportion of 1 volume of concentrated solution to 9 or 10 volumes of water for sheep and 7 or 8 volumes of water for horned cattle.

II.—Watkins-Pitchford's Arsenical Solution:—

Sodium Arsenic (80% arsenic)4 lb.
Soft soap.....3 lb.
Vaseline Oil.....1 gallon.
Water.....100 gallons.

Dissolve 4 lb. of sodium arsenite in about 1 gallon of hot water; when the solution is cold, add cold water to make the volume up to 88 gallons; then add the emulsion stirring constantly and make up with water to a volume of 100 gallons.

According to the author these dips, including Cooper's Fluid, have some drawbacks. The sodium arsenite may cause more or less serious inflammation of the skin, which becomes covered with cracks, and diarrhoea, or it may become inactive by changing into arseniate. However, these occurrences will always be of slight importance and should not prevent the adoption of this method of treatment of scab in domestic animals.

650.—**The Creation of an American Utility Horse.**—WILLIAMS, J. O., in *U.S. Department of Agriculture, Department Circular* 153, 22 pp. Washington, March, 1921.

American light horses have long been world-famous in several highly specialized lines—for example, the trotting and saddle breeds.

The United States Department of Agriculture has recognized the need of developing a type of the native light horse suitable for general utility work on farm or ranch. With this end in view, co-operative experimental breeding work has been carried on for many years by the Department of Agriculture and horse-breeders. The ideals sought in this new type of horse are a uniform combination of size, substance, soundness, endurance and a sufficiency of speed.

Although the motor-car, motor-truck, and tractor undoubtedly will displace some horses, nevertheless, the active, sizable, utility horse, will be an increasingly important factor in American farming, especially in those sections where the heavy-draught breeds are not the most economical to use.

The co-operative breeding work was begun in 1904, with several selected mares, and the standard-bred stallion "Carmon." This remarkable sire is still used in the development of the work. The Bulletin analyzed describes the progress hitherto made at the United States Wyoming Horse-breeding Station.

837.—**Herd Books of French Breeds of Cattle.**—MESLAY, in the *Bulletin de la Societe des Agriculteurs de France, Comptes rendus de l'Assemblee Generale de 1921*, meeting of March 9 (fifty second session), Part 2, pp. 44-46. Paris, 1921.

Meslay emphasizes the great services rendered by Pedigree Books and Herd Books in showing the way to improve French breeds of cattle much sought after by foreign breeders and notes that there are still too few of these Books in France. For the 30 or 35 breeds of cattle there are scarcely 15 Herd Books, of which only 8 or 10 are fully successful; the others are embryonic or in course of formation. Nevertheless the inquiry made by the Bureau of Cattle Improvement shows that a certain amount of progress is being made generally; besides some very good Herd Books some of which have already been 35 years or more in existence, others of more recent dates are not less successful.

The different Herd Books regarding which the Bureau has obtained information are the following:—(1) The Herd Book of the *Montbeliarde breed.* (2) The Herd Book of the *Limousine breed.* (3) The Herd Book of the *Charolaise breed* of the Nievre, Saone-et-Loire and affiliated Departments, fusion of two Pedigree Books of the Nievre and Saone-et-Loire comprising a total of about 11,000 entries of cows and heifers and about 5,000 bulls. (4) The Herd Book of the *Normandy breed of cattle*, a most successful collection comprising 18,000 to 20,000 entries of bulls, cows, and heifers. The Herd Book of the continental *Jersey breed.* (6) The Herd Book of the *Parthenaise breed* with a family or sub-breed, called Maraichine, very good milkers and very hardy, for which a Herd Book has not yet been compiled. (7) The Herd Book of the *Garonnaise breed.* (8) The Herd Book of the *Bazadaise breed.* (9) The Herd Book of the *Maine-Anjac breed* comprising 1,500 members and which has entries of about 8,000 animals. (10) The Herd Book of the *Black Piebald Breton breed of Finistere and Morbihan.* (11) The Herd Book of the *Armoricaine breed*, a cross between the Black Piebald and Durham breeds, with entries of 713 animals. (12) The Herd Book of the *Red Piebald Breton breed*, very clearly distinguished from the two last. (13) The Herd Book of the *Tarentaise breed*, in process of compilation. (14) The Herd Book of the *Pyrenean breed* of the Southwest with pink *mucosae.* Besides these different Herd-Books, there are a great number of breeding syndicates created before the war and other small Communal Societies with bull owners. It would be desirable that these breeding Syndicates

should first endeavour to maintain pure breeds in the districts where these exist, and then to compile for each of the breeds a Pedigree Book or a Herd Book.

839.—Experiments in Great Britain on the Effect of Feeding Concentrates Either as Warm Mashes or Dry, and of the Percentage of Succulent Foods in the Ration, on the Production of Milk.—BERRY, R. A., in *The Journal of Agricultural Science*, Vol. XI, Part I, pp. 78-98. London, January, 1921.

Experiments carried out at the College Experimental Station at Kilmarnock, Scotland, with Ayrshire cows. Conditions which might influence milk production, such as the health and appetite of the cows and the weather were recorded daily. For each ration figures indicating the content in nutritive material are given.

Influence of Concentrates Fed Either Dry or as Warm Mashes on the Milk Production.—During the three weeks preceding the experiments one-half of the meals were fed dry in the morning and the remainder as mashes in the evening. For the mashes the concentrates were mixed, scalded with boiling water (½ gallon to 9 lb. of the mixed meals) and 1 oz. of rocksalt was added.

The mixture was fed in a sloppy condition at the body temperature. As short-period experiments (5 weeks) evidenced the beneficial effect of the concentrates fed as mashes on the milk production, experiments lasting 17 weeks were proceeded with, using 10 cows divided into two groups, and taking into account their period of lactation, milk production, etc. During the first period of the experiment, lasting 5 weeks, the cows in group I were given the concentrates dry and during the subsequent periods, lasting respectively 10 and 2 weeks, the concentrates were fed alternately wet and dry. The cows in group II commenced with the concentrates fed as mashes during the first period and during the subsequent periods the concentrates were fed alternately dry and wet.

The daily ration per cow was composed of: Turnips 30 lbs., hay 7 lb., oat straw 10 lb., bean meal 3½ lb., crushed oats 3½ lbs., decorticated cotton cake 2 lb. The cows were watered once a day for 30 minutes at a trough in the yard and drank on an average 5·7 gallons and 4·6 gallons respectively per head for groups I and II.

The quantity of milk produced by feeding the concentrates as mashes was greater by about 1 lb. per head per day than the quantity produced by feeding the concentrates dry. The increase diminished with the advance in lactation. The warm mashes produced a distinct laxative effect and were more readily eaten than the dry meals. It was noticed that the cows fed on rations containing the concentrates in a dry state lost the good condition of their coats. With a change back to rations containing the concentrates in a wet state or when water was readily obtainable in the byre, the animals recovered the normal condition of their coats. An increased water supply did not appear to have any effect on milk production.

In another experiment carried out in similar conditions to the former, except that the ration was modified, the periods reduced and that the cows were given water *ad lib.*, it was ascertained that for the production of 1 lb. of milk an average of 3·5 lb. of water (drinking water + water contained in the food) was consumed when the cows were fed with a normal winter ration containing 30 lb. of turnips and part of the concentrates given as wet mashes. The ratio of water consumed varied with individual cows, with the preparation of the food (concentrates wet or dry), the proportion of fodder in the ration, the period of lactation of the cows, and the temperature. For 1 lb. of dry matter in the food 3·6 lbs. of water was consumed. The total quantity of water consumed per day (drinking water + water contained in the food) amounted to about 10 gallons, of which 50 to 60% was drinking water; from 25 to 30% of the total water consumed was contained in the milk.

Influence of the Quantity of Succulent Food (Roots) contained in the Ration on the Yield and Fat Content of the Milk.—Experiments in which the quantity of water necessary for the animals was furnished respectively by feeding with succulent food (swedes) and by feeding with rations in which part of the water was taken as drinking water.

The experiments were made with 7 cows which during the first period of the experiment were given 112 lbs. of roots in their ration. During the subsequent periods 56 lbs. and 22 lbs. respectively, of roots were replaced by concentrates and fodder so as to maintain the same weight of proteins, fats and carbohydrates in the ration. The daily ration per cow was the following:—Turnips 112 lbs., hay 5 lbs., oat straw 12 lb., mixed concentrates 7 lb., (bean meal, earthnut cake, crushed oats, bran and fish meal). One half of the concentrated was fed dry and the remainder in a sloppy condition.

EXPERIMENTAL DATA COLLECTED FOR THE VARIOUS PERIODS

	January	February				March				
	28	4	11	18	25	3	10	17	24	31
Average daily milk yield..... lb.	30·3	29·1	28·7	27·2	26·3	25·2	25·4	25·0	24·8	24·0
Total solids..... %	12·69	12·91	12·72	12·8	13·21	13·4	13·53	13·62	13·31	13·4
Fat weight..... lb.	1·03	1·06	1·00	0·99	1·02	1·04	1·12	1·13	1·01	1·1
Solids not fat..... lb.	2·83	2·70	2·65	2·49	2·45	2·34	2·32	2·29	2·24	2·2
Total solids..... lb.	3·86	3·76	3·65	3·58	3·47	3·38	3·44	3·42	3·34	3·2
Roots..... lb.		112				56			90	

A heavy root ration (112 lb.) had a strong purgative effect which adversely affected the health and general condition of the animals. The milk yield, which had shown a tendency to increase at first, definitely decreased later. Although there was an increased percentage of fat, the weight of fat produced diminished. The fall in milk yield was partly, but not immediately, arrested by a change to a moderate root ration. As a consequence there was a decided increase in the percentage and total yield of fat. The consumption of water (drinking water) + water contained in the food) per 1 lb. of dry matter amounted to 3·9 lb. with a ration containing 112 lb. of roots and to 3·3 lb. with the moderate root ration. Some of the cows fed with the heavy root ration took on an average between 5 and 6 per cent of the total intake of water in the form of drinking water. The data relating to the influence of the temperature on the milk yield are given in 6 graphs in the text.

656.—Plant Foods Rich in Protein Replaced by a Digestible Form of Animal Epithelial Products in Rations Fed to Wool-Producing Sheep; Experiments Carried Out in Germany.—ZUNTZ, N., in the *Biedermann's' Zentralblatt*, Year XLIX, Part 5, pp. 189-190. Leipzig, May 1920.

A means of increasing wool-development in sheep without the use of foods with a high protein content.

As is well known, sulphur-containing cystine, an albuminoid derivative, is the substance chiefly concerned in the growth and development of wool. Only 0·3 to 2·5% of it is to be found in the protein of nutrient liquids, and it sometimes occurs in even smaller quantities in protein food substances, whereas the cystine content of the horny constituent of wool is as much as 7·3%. Thus, in order to obtain the necessary amount of cystine, considerable quantities of protein have to be ingested. Further, it has been found, that after the decomposition of the protein and the elimination of the cystine, all the other matters that make up food protein are lost, as regards the formation of animal albuminoids, which explains the relatively large quantities of protein required in the ration, in order to obtain a good wool-yield from sheep.

As foods rich in protein are lacking in Germany, the author, with a view to economizing plant proteins, tried to give sheep all the nutrients required for inducing the growth and development of their wool by adding to their rations, hair and other epithelial products that have been rendered digestible by chemical action. The results of the experiment were satisfactory; 4 sheep were given equal amounts of disintegrated straw and mangolds, the quantity being sufficient to maintain the weight of the animals.

Of the 4 sheep used in this experiment, 2 were given from 9 to 10 gm. of digestible horn in their rations per head per day.

After the experiment had lasted for four months, the fleeces of these animals, were much finer than those of the sheep which had been given no horn, and microscopic examination showed that the diameter of the staple exceeded by one-third that of the wool produced by the control animals.

FARM ENGINEERING

669.—A Combined Dodder and Plantain Seed Eliminator and Threshing Machine.—MANRIN, G., in the *Journal d'Agriculture Pratique*, Year 85, No. 15, pp. 293-294. Paris, Apr. 16, 1921.

Before high speed threshing machines (which date from 1889) came into use, the cleaning of fodder seeds was done by hand, or, rarely, with a small special machine, the chaff being then passed on to the chaff separator; but, between the two operations it was not noticed that certain weed seeds, such as dodder and plantain, were, so to speak, automatically eliminated owing to their shedding their seeds very easily relatively to the shedding of seed by the forage plants.

With highpower threshing machines constructed for forage seeds, effecting consecutively the various steps of cleaning, the weed seeds were not eliminated and it even happened that the machine exercised a disastrous selection by leaving among the seeds of the fodder plants the large seeds of dodder and plantain.

G. Duval, 46, Boulevard Gambetta, Saint-Quentin (Aisne) having noticed how easily parasitic plants shed their seeds as compared with forage plants, constructed a machine for eliminating dodder and plantain seeds, in the form of a sieve in the shape of a truncated cone through which he passes the chaff before cleaning it.

Duval's machine for eliminating dodder and plantain seeds was then tested by Ringelmann at the machine testing station; 12 series of tests were carried out on chaff of various origins (lucernes from the Aisne, white and violet clovers from the Aisne, crimson clover from Vendee, "minette" of the Aisne) and the produce was examined at the seed testing station. The results were considered excellent. At that time it was a separate machine through which was passed the product furnished by the first thresher; it eliminated all the seeds of parasitic plants and the residue had to be passed on to a second thresher.

Duval now presents his dodder and plantain seed eliminator mounted on a high speed threshing machine. The dodder eliminator is placed at the back below the shakers, and receives the produce passed on by the chaff beater, removes the dodder and plantain seed and then feeds the cleaner which is placed below; the latter thus only receives and has to deal with the chaff completely freed from the seeds of dodder and plantain.

According to the construction of the threshing machine, the dodder eliminator may occupy other positions, but it must always be placed immediately in front of the cleaner which it feeds with chaff freed from parasitic seeds.

With this system the seed of forage plants furnished by the thresher sells at an enhanced rate which may amount to as much as 15 and 20% owing to the difficulty that is found in separating dodder and plantain seeds that are mixed with seeds of forage plants, from which only the smallest of these parasitic seeds are eliminated, leaving the larger ones mixed with the seed used by the farmer.

670.—**The "Pax" Sprayer.**—L. D., in *Le progres agricole et viticole*, Year 38, No. 20, pp. 477. Montpellier, May 15, 1921.

It is well known that with ordinary sprayers, even with the best, too much of the liquid is wasted in spraying bunches of grapes, and it can be understood that, when it is a case of using an expensive solution, such as that of nicotine, there is some hesitation in giving the treatment on the grounds of expense.

The "Pax" sprayer effects a great economy of the liquid, From its powerful jet an excessively fine spray is emitted which envelops the whole grape and is deposited all around it.

The apparatus consists of a tubular brass body (cylinder of the pump) with a wooden handle in the middle; at one end of the body there is the jointed fulcrum of the lever of the pump, at the other end the suction valve with its sieve and the cock to which fits the india rubber tube connecting the "Pax" sprayer with the receptacle carried on the back of the operator. The pressure is obtained by means of a hollow-stemmed piston moved by the lever. This piston communicates directly with a nozzle fitted with a compression valve.

The apparatus is very simple; all parts are easily got at. Although the spray is emitted under a pressure of 20 atmospheres, almost 10 times that of an ordinary sprayer, the apparatus works very smoothly and the lever can be worked by a woman.

The "Pax" sprayer can be used with receptacles of any kind of sprayer without modifications of those receptacles.

752.—**The "Mav" Cultivator for Rocky Land.**—MARRE, E., in *Le Progres agricole et viticole*, Year 38, No. 19, pp. 455-458. Montpellier, May 8, 1921.

This new tillage instrument, designed especially for the rocky lands of the Causse, but which would be serviceable on all stony soils, even when not calcareous, has been thought out and constructed by M. Beteille, Materiel agricole et viticole (Mav), rue Pasteur, Beziers.

It has a rigid strong frame of special steel with riveted joints. The working pieces, of cast steel with interchangeable parts of hard steel, can move out of the way on meeting abnormal resistance, such as that of a rock; they are kept in place or brought back into working position by powerful springs with a very small movement, which saves them from being bent or broken. The working pieces are fixed to the frame by means of bolted rings bearing the axis round which these pieces move.

The penetration of the teeth into the soil is brought about by means of a crank axle governed through a screw by a fly-wheel, a chain, and a roller lifting the front at the same time, a seat, situated opposite the flywheel, enables a man to regulate the depth of digging while working.

The weight of the apparatus is about 1,100 lbs. It can loosen a strip of ground 5½ feet wide; in very favourable soil an average depth of 6 inches can be reached, if necessary, by passing twice over the ground; but according as the difficulties, (hardness of the ground, the length of time it has been fallow, etc.), increase, it will obviously be necessary to pass more often over the ground to attain that depth. When that depth is reached, the soil is ready for sowing.

758.—**Reciprocating Butter-Worker.**—MAURIN, G., in the *Journal d'Agriculture pratique*, Year 85, No. 1, No. 20, pp. 397-398. Paris, May 21, 1921.

With this new butter-worker, called "alternating" it is possible to work up very small quantities of butter for which hitherto a spatula and a dish were used to get rid of the buttermilk and to work up the butter. This butter-worker, consists of a prismatic hopper with a triangular base, divided into two compartments by a partition below which rotates, in a horizontal plane, a grooved wooden cylinder worked by a crank handle outside. This handle can be placed either in the right or left of the hopper, the latter being able to rock backwards and forwards on two pivots below held in a frame which is attached to a table.

The butter is placed in the hopper which for the moment is uppermost; on rotating the grooved cylinder it draws and flattens the butter and removes the buttermilk in forcing the butter into the lower hopper, which slopes slightly so that the buttermilk and the water used for washing will drain away. Then the hopper is turned over on its lower pivots and the grooved cylinder is rotated in the opposite direction. The operation is repeated as often as is necessary, the butter being sprinkled with clean water. After passing a few times the butter is thoroughly washed, worked up and separated from the buttermilk; it can be salted at the same time.

This butter-worker is made by the firm of L. David, 56 Route d'Evreux, Vernon (Eure), France.

RURAL ECONOMICS

759.—**Cost of Milk Production in Some States of the North American Union.**—*The Creamery and Milk Plant Monthly*, Vol. X, No. 1, p. 43. Chicago, Ill., January, 1921.

The best way of estimating the cost of milk production is to determine it carefully in each administrative unit. The Dairy Division of the Department of Agriculture of the United States has instituted an enquiry for this purpose addressed to the groups of farms in 7 States of the Union. Data referring to 4 groups are now at hand. Each group consists of 20 dairies that are typical for their administrative unit.

The aim has been as far as possible to estimate the cost of production by quantity, rather than by price, in order to be always able to interpret the data by supplying the current price. A summary of the data is given in the following table:

UNITS NECESSARY FOR THE PRODUCTION OF 100 LBS. OF MILK

	Indiana (1)		Vermont		North Carolina (2)		Washington	
Average annual milk production per cow (pounds)	6,937		5,252		4,915		7,833	
Percentage of butter fat	3·8		3·9				3·7	
	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer
Grain ..... lb.	38·5	20·0	33·1	8·7	57·8	48·4	29·4	5·2
Hay and other dry roughage ..... lb.	66·8	27·4	129·9	18·7	78·5	36·9	92·9	7·5
Ensilage and other succulent roughage ..... lb.	147·6	60·1	191·3	27·8	181·5	87·0	143·3	40·4
Hauling and grinding of concentrates ..... $	0·03	$ 0·014	$ 0·020	$ 0·005			$ 0·022	$ 0·003
Litter ..... lb.	20·3		11·2		$0·008 (a)		9·0	0·1
Pasture ..... acres		0·040		10	$0·012 (a)	$0·205 (a)		0·025
Human labour ..... hours	2·5	2·2	2·7	2·0	3·6	3·2	1·9	1·8
Horse labour (3) ..... "	0·3	0·2	·6	0·4	1·8	1·8	·01	0·015
Over-head and other expenses	$ 0·385	$ 0·393	$ 0·555	$ 0·425	$ 0·537	$0·495	$ 0·576	$ 0·406
Calf credited units (4)	0·012	0·013	·025	0·009	$0·548 (a) (calf and manure)	$0·430 (a)	0·017	0·009

(a) The data for these items were obtained in money value.
(1) U.S. Department of Agriculture, Bulletin 858.
(2) North Carolina Department of Agriculture, Bulletin 266.
(3) Most dairy farmers sell their milk retail, and this labour was for transport.
(4) By unit, 1 calf is understood.

AGRICULTURAL INDUSTRIES

677.—**Cold Storage of Fruits Liable to Deterioration.**—CRUESS, W. V., OVERHOLZER, E. L., and BJARNASON, S. A., in *California Agricultural Station Bulletin* 324, pp. 25-43. Berkeley, Cal., 1920.

The authors rapidly pass in review the previous work of Fulton and Darrow on the methods of preserving small fruits by cold storage. They then recount the results of their own experiments, in which freshly-gathered cherries, apricots, loganberries, black currants and freshly prepared grape juice were subjected to different treatments before being placed in the cold chamber, and after several months of cold-storage, examined in order to ascertain their colour, texture and aroma, and subsequently used in making various products, such as jellies, syrups, tinned fruits, preserved fruits, jams and ices.

It has been found, that, whereas fruit which is not treated, and is kept at a temperature of about 0° C., loses its flavour and spoils, after some three weeks, the same fruit preserved in water, or syrup, at a temperature varying from −11° to −13° C., retains its flavour and colour for at least one month. The best results are obtained by crushing the fruit, with or without the addition of sugar, and keeping it at a temperature of −11° to −13° C. Grape-juice preserved at this temperature is much superior in aroma and flavour to pasteurized grape-juice. The breweries, which on account of prohibition, can no longer make beer, are very well equipped with plant suitable for the cold storage of soft fruits and of fruit-juice.

765.—**Contribution to the Knowledge of the Biochemical and Biological Qualities of Goats' Milk.**—CORDES, F. in the *Zeitschrift fur Ziegenzucht*, Year XXII, No. 1, pp. 1-3. Hanover, 1921.

The author registered the milk production of goats during one period of lactation, and determined the percentage of fat in the milk; in addition he determined the acidity, the catalase and diastase, and he made the alcohol test.

The milk production, which was 800 kg. per period of lactation before the war, has now decreased to between 500 and 400 kg., a quantity which is still equivalent to from 10 to 13·5 times the live weight. The fat content was variable. The average figures of the percentage of fat in the milk of the different goats varied between 2·72 and 4·11%. The morning milk was, on the average, poorer in fats than the evening milk and the latter poorer than the mid-day milk.

The fat content of the morning milk is recorded as 3·29%, that of the mid-day milk as 4·19% and that of the evening milk as 3·94%.

The alcohol test for ascertaining the freshness was of no use as the milk coagulated every time.

The degree of acidity was determined by the Sohxlet-Henkel method. The values obtained showed great variations; the average figure was 4·7 degrees of acidity. The determination of the catalase gave results showing considerable differences. Thus treating 15 cc. of morning milk with 5 cc. of H_2O_2 gave the lowest value of 0·5 catalase and a highest value of 7; the average was 2·25. The figure of catalase increased with the age of the goats.

The estimation of the diastase in goats' milk was made with Konings' method; here also a marked difference was recorded between the morning and evening milk; the smaller milkings showed the higher figure of diastase; 10-30 mgm. of starch were decomposed in 30 minutes by 100 cc. of fresh raw milk. No influence of the period of lactation on the diastase content was noticed.

767.—**The Frozen Meat Industry in Brazil.**—*La Revue generale du Froid et des Industries frigorifiques*, Year II, Vol. II, No. 3, pp. 87-91. Paris, March, 1921.

The frozen meat industry in Brazil is of quite recent date, since it began in 1914; the first consignment to London, 3,000 lb., was made in December of that year by the Osasco and Barretos packing houses in the State of Sao Paulo.

During the war the enormous demand for frozen meat required for the Allied armies gave this industry a remarkable impetus; the following statement shows the total shipments from Brazil each year up to 1920:—1914, 1,415 tons; 1915, 8,514 tons; 1916, 33,661 tons; 1917, 66,452 tons; 1918, 60,508 tons; 1919, 54,094 tons and 1920, 63,600 tons.

From an examination of these figures it would seem that the demand due to the war resulted, as principal effect, in the sudden creation of the meat industry and that this industry, which has now reached the stage of regular production, shows a tendency to develop normally, the price of Brazilian meat tending at the same time to keep level with those of other similar markets.

Statistics of 1913, based on an official census of cattle in the various States of Brazil, gave a grand total of 30,705,080 head. The States which had most cattle were:—Rio Grande do Sul, with 7,249,000 head; Minas Geraes, with 6,861,000 head; Bahia, with 2,683,000; Matto Grosso, with 2,050,000 head; and S. Paulo, with 1,322,000 head.

These figures are no longer accurate, the cattle in certain States in Brazil having considerably increased since 1913. Thus, according to recent information, Rio Grande do Sul has at present more than 8 million cattle, Minas Geraes about 7,500,000, S. Paulo, 3,803,205. These are the three

States in which cattle breeding has been specially developed and improved by the introduction of well bred bulls.

There would be no exaggeration in fixing the present number of cattle at 35 million head.

In 1913, the total number of cattle in Brazil and other cattle breeding countries in decreasing order of importance were as follows, in millions of head:—United States 63; Russia 37·3; Brazil 30·705; Argentine 29; Germany 20·15; Austria 17·8; France 14·5; England 11·8; Algeria and Tunis 11·3; and Canada 10. In the same year the average price of an average steer in Brazil was less than half the price in the United States.

It cannot be said that any breed properly speaking is found in Brazil, and all efforts of breeders are directed towards the creation of a breed by crossing and selection.

There is no doubt that in the matter of pasturage Brazil is particularly fortunate. Enormous stretches of land, selling at very low prices, are found in the north of Parana and Rio Grande do Sul, or the borders of Parana and Paraguay, as far as Matto Grosso, abundantly watered and situated at a sufficient altitude to furnish excellent pasture although the grass there is, apparently, fairly hard.

The frozen meat from Brazilian cattle has been recognized as capable, as regards quality, of comparison with the best Argentine, Uruguayan, Australian or Canadian meat on the English and French markets.

Argentine cattle yield on an average 1,000 lb. of meat per animal, whereas in Brazil the average barely reaches 500 lbs.

Consequently the 30 million head of cattle in Brazil only represent in utilizable weight, compared with the 29 million head of Argentine cattle, some 15 million head actually.

As, on the other hand, the home consumption is greater in Brazil than in La Plata, the first deduction to be drawn from these facts is that the present condition of the Brazilian herds is a long way from showing a potential annual export equal to that of the Argentine, which amounts to about 600,000 metric tons. With the generally primitive methods of keeping cattle in Brazil and the mortality which is thus caused, it is not possible to estimate a higher average annual production than 10%.

The possible export would be about 700,000 head, which at an average weight of 250 kg. would give a total of 175,000 tons of meat.

At present the capacity of industrial production is far from reaching this amount. At the present moment, there are in Brazil 12 undertakings engaged in the production and preservation of frozen meat, of which 10 are working.

The first nine establishments in working are controlled by the Federal Government and the last by the Municipality of Rio de Janeiro. During the first half of 1919, 93,250 head of cattle were slaughtered at the Swift Current cold storage at Rosario alone. For the year 1919 the export of chilled and frozen meat was as follows, for the 3 great ports of shipment:—

Rio de Janeiro...	15,260 tons	54,094 metric tons
Santos.....	32,034 "	
Rio Grande do Sul	6,800 "	

As the best breeding areas are certainly Rio Grande do Sul followed by Matto Grosso and Minas Geraes, for which the port of shipment is Rio de Janeiro, it is not expecting too much to anticipate that the export from these three States will quickly reach 100,000 tons, but on condition that this quantity can be transported to the European markets by regular and sufficient lines of ships with cold storage. There, apparently, lies the kernel of the matter for, at present, the transport capacity for frozen meat certainly is not adequate to the production.

PLANT DISEASES

678.—**The Organization and Working of the Italian Phytopathological Service.**—Ministero per l'Agricoltura, Direzione dell'Agricoltura, *Rules for the application of the Phytopathological Regulations*, pp. 24, Rome, April, 1921.

A brief account of the present organization of the Italian Phytopathological Service, together with a summary of the directions for the application of the phytopathological regulations issued since 1913, especially in connection with the by-law of March 12, 1916, No. 723.

It contains a specimen of the permit-form necessary for despatching certain prohibited produce to the interior of the kingdom, and also of the immunity-certificate form for exportation outside Italy.

865.—**Flag Smut (Urocystis Tritici) A Tilletia injurious to wheat, recently introduced into the United States.**—TISDALE, W. H. and GRIFFITHS, M.A., in *United States Department of Agriculture, Farmers' Bulletin* 1213. 6 pp. Washington, D.C., May, 1921.

Flag smut of wheat (*Urocystis Tritici* Koern), a parasite long known in Australia, where it causes considerable loss every year, and also occurring in Japan, India, and South Africa, has recently been introduced through some unknown means into the United States.

The first report of the disease in the latter country came from the vicinity of Granite City, Madison County, Ill., in 1919, in which year a number of fields in the district were found to be infested. During the season of 1920, in the neighbourhood of Granite City, flag-smut was found in 111 fields

comprising 2,500 acres, in an area of about 47 sq. miles.

The disease is characterized by the appearance of black stripes running lengthwise in the leaf blades and sheaths, due to the chlamydospores of the fungus. The upper leaves of the plant are usually the most severely attacked, the stems are also infected to some extent. The diseased plants are generally more or less stunted, and they rarely head out, or produce seed. As a rule, all the stalks of an infected plant are attacked, but occasionally one or two remain immune.

Flag smut is spread in two ways. In threshing, the spores are knocked out of the diseased leaves and scattered over the grain to which they adhere; they germinate at the same time as the wheat when the latter is sown. This is perhaps the chief method by which the pest is propagated, the other way of spreading it, is by means of spores which find their way into the soil from infected straw, stubble and fragments of plants left on the ground when the wheat is cut, and may be carried long distances by wind and running water. Sometimes they are blown out of the separator to land near to the place where grain is being threshed. In whatever way they reach the field, the chlamydospores germinate there, and if near to seeds, may infect the young wheat seedling in the same way as those clinging to the seeds.

In order to prevent the spread of flag smut beyond the quarantined area in Madison County, and to eradicate it if possible from the infested district, the United States Department of Agriculture and the Illinois Department of Agriculture have taken steps in co-operation, and agreed upon the adoption of the following measures:

(1) Thorough treatment of all the grain with formaldehyde as it comes from the separator.

(2) Burning all straw in the infected area as soon as possible after threshing.

(3) Sowing no wheat on infected land, and as far as possible sowing no wheat on land which was under wheat the previous year.

(4) Obtaining seed from localities known to be free from flag smut.

(5) Treatment by the copper-sulphate, or blue-stone method, of all seed to be sown. The coating formed by the blue stone and lime protects the seed from infection by chlamydospores present in the soil.

(6) Growing varieties of wheat that are considered resistant to the disease.

Experiments conducted by the United States Department of Agriculture and the Illinois Agricultural Experiment Station have already shown, that certain varieties of wheat are, more or less, resistant to flag smut.

Fulcaster, Gipsy, Red Wave, Turkey Red, and Early May are wheats with a combination of disease resistance and good yielding ability. They are therefore strongly recommended for use in the flag smut area of Madison County.

Certain other varieties (for instance Red Cross, Salzer Prize Taker, Salzer Pride, Dawson Golden Chaff, Illini Chief, and Jones Winter Fife), should not be grown under any consideration in the infested area, because of their susceptibility to the disease.

The United States Department of Agriculture, the Illinois State Department of Agriculture and the Illinois Agricultural Experiment Station are aiding farmers in every possible way to eradicate this destructive wheat pest.

867.—**Bacterium Exitiosum N.SP. Injurious to the Tomato in the United States.**—GARDNER, M. W., and KENDRICK, J. B., in *Journal of Agricultural Research*, No. 2, pp. 123-156. Washington, D.C., April 15, 1921.

During recent years, the tomato crops in many of the north Central States (Tennessee, Illinois, Michigan, Iowa, Indiana—where the authors' researches were made—Georgia, and Florida), have been affected with a spot disease of the fruit of bacterial origin. Outside the United States, this disease has only been found for certain, up to the present, in Canada, and the Union of South Africa.

It attacks both the leaves and fruit of a large number of varieties of tomato. Sometimes, it occurs not only on adult plants, but also on seedlings. From the experiments made, it appears that the fruits of the capsicum, and the leaves of the potato are also infected with this disease.

On the tomato, the fruit lesions are small, black, scab-like spots usually superficial, sometimes crateriform. Leaf lesions are at first translucent, later black and greasy, with transparent margins, and are not usually limited by the veins.

The spots on the fruit are unsightly, and if numerous and large, render the tomatoes unsaleable, further, they afford entrance to to rot-producing micro-organisms. Canners object to this disease, because even the rather superficial lesions are not removed with the skin, so affected fruit cannot be used for first-grade canning stock.

Seedlings suffer equally severely from this malady.

The pathogenetic organism is a bacterium of which the authors give a detailed morphological and biological account in their paper under the name of *Bacterium exitiosum* n.sp.

Field observations indicate that fruit infection occurs through the punctures of insects. Inoculation tests prove that no infection of fruits takes place unless the epidermis is mechanically punctured. It is not, however, necessary that the bacterium should enter at the time the puncture is made; once present on the surface of the fruit, it takes advantage of any pre-existing

wound. Leaf infection apparently occurs through the stomata, and the lesions are more abundant on the lower surface. Young leaves are the most susceptible to the disease.

The bacterium winters on the surface of the seed and is thus disseminated. Commercial seed from fields known to be diseased has yielded about 1% of infected seedlings. The disease is also propagated by young plants when transplanted.

693.—**A New Preparation of Copper Aceto-Arsenite (Paris Green) and Its Practical Advantages in the Control of the Animal Pests of Plants.**—ESCHERICH, K., in the *Deutsche Landwirtschaftliche Presse*, Year XLVIII, No. 15, pp. 104-105. Berlin, February 23, 1921.

The use of Paris Green (copper aceto-arsenite) in the form of powder presents various difficulties. In order to obviate these, the insecticide has been recently placed on the market in Germany in tablets, each about the size of a tablet of chocolate, and containing sufficient of the compound to make a hectolitre (22 gallons) of spraying-mixture. Each tablet is divided by grooves into five smaller divisions, one of which is enough to make twenty litres (4·4 gallons) of the mixture for spraying. Each of these smaller divisions is, in its turn, subdivided transversely, into equal parts, one of which is sufficient for preparing 10 litres of spray. In this manner, the weighing of the substance, an operation entailing loss of time and material, is completely dispensed with.

Further, the neutralizing agent has been incorporated into the tablets, so that the troublesome business of adding lime is wholly unnecessary.

Another and more important practical advantage possessed by the new preparation is its considerably increased power of suspension, as compared with "Uraniagrun" (the name usually given in Germany to aceto-arsenite of copper in powder form).

The experiments made by the authors have proved the new preparation to be entirely satisfactory in every respect.

OTHER ARTICLES ON SCIENCE AND PRACTICE OF AGRICULTURE

On account of lack of space the following articles in the International Review of the Science and Practice of Agriculture can only be referred to. Anyone desiring the articles may obtain them from the Institute Branch, Department of Agriculture, Ottawa.

The Agricultural Institute of Algeria.—BRUNEL, M., in *International Review of the Science and Practice of Agriculture*, Vol. XII, No. 6, pp. 659-666. Rome, June, 1921.

597.—**A New Classification of the Soil Moisture.**—BOUYOUCOS, G., in *Soil Science*, Vol. XL, No. 1, pp. 33-47, Bibliography of 9 works. Baltimore, January, 1921.

598.—**Soil Ingredients Withdrawn by Various Fruits.**—COLBY, G. E., in *The Monthly Bulletin of the Department of Agriculture, State of California, Chemistry Number*, Vol. X, No. 1, p. 23. Sacramento, California, January, 1921.

602.—**Watering by Imbibition in Market Garden Cultivation.**—STAPPAERT, E., in the *Revue horticole belge*, Year 2, No. 5, pp. 64-44. Huy, May 1, 1921.

610.—**Line Selection of Wheat at the Phyto-technological Station "La Moncloa," Madrid.**—*Estacion Central de Ensayo de Semillas, Boletin trimestral*, Year I, No. I, pp. 2-7. Madrid, March, 1921.

611.—**The Improvement of Wheat and Oats by Selection, and by Crossing Combined With Selection, in the United States.**—HAYES, H. K., and GARBER, R. J., in *The University of Minnesota, Agricultural Experiment Station*, Bulletin 182, pp. 1-44. St. Paul, Minn., March, 1910.

612.—**The Improvement of Barley by Pure Line Breeding and Crossing Combined With Selection, in Minnesota, United States.**—HARLAN, H. V., and HAYES, H. K., in *The University of Minnesota, Agricultural Experiment Station, Bulletin* 152, pp. 1-44. St. Paul, Minnesota, March, 1919.

613.—**A New Means of Obtaining Types of Maize With a High Gluten Content.**—EAST, E. M., and JONES, D. F., in *Genetics*, Vol. 5, No. 6, pp. 543-610. Baltimore, November 9, 1920.

634.—**Suggestions for the Right Selection of Apple and Pear Stocks.**—HATTON, R. B., in the *Journal of the Royal Horticultural Society*, Vol. XLV, Pts. 2 and 3. London, July, 1920.

643.—**Experiments on the Value of Intra tracheal Injection for Creating Active and Passive Immunity.**—PFENNINGER, W., in the *Annales de l'Institut Pasteur*, Year 35, Vol. XXXV, No. 4, pp. 237-260. Paris, April, 1921.

662.—**Progress of Power-Farming in France. Institution of a Central Committee of Mechanical Cultivation and Establishment of Experimental Stations.**—I. *Journal officiel de la Republique Francaise*, Year LIII, No. 32, pp. 1524-1530. Paris, Feb. 2, 1921; II. *Ibid.*, No. 126, p. 5626, May 11, 1921.

666.—**Coupling Binders to Tractors.**—RINGLEMANN, M., in the *Journal d'Agriculture pratique*, Year 84, No. 27, pp. 14-16. Paris, July 1, 1920; No. 28, pp. 33-35, July 8, 1920.

674.—**Experiments Made in the United States on the Dry-Air Sterilization of Dairy Utensils.**—AYERS, S. H., and MODGE, C. S., in *Journal of Dairy Science*, Vol. IV, No. 2, pp. 79-90. Baltimore, 1921.

702.—**The Influence of Temperature and Rainfall on the Yields of Certain Kinds of Wheat at Svalof and Ultuna, Sweden.—Recent Development of the Organization of the Service of Agricultural Meteorology in Sweden.**—WALLEN, A., in *Geografiska Annaler*, Year 1920, Part IV, pp. 332-357. Stockholm, 1920.

711.—**Characteristics of Norwegian Spring Wheats Compared with Those of Other Exotic Wheats, and Their Improvement by Means of Selection.**—KNUT, VIK, in the *Norges Landbrukshoiskoles Akervekstforsok*, Year 30, pp. 7-36. Christiania, 1920.

712. **The Number and Behaviour of the Chromosomes in Certain Wheat Hybrids.**—HITOSHI KIHARA, in *The Botanical Magazine*, Vol. XXXV, No. 410, pp. 19-24. Tokio, February, 1921.

733.—**The Identification of Different Timbers.**—PICCIOLI, L., in I.I.I. *Rassegna settimanale illustrata della produzione italiana*, Year V, Gen. Ser. No. 16, Sect. C., No. 4, pp. 13-15. Milan, April, 1921. (12 pages in the Institute Bulletin).

751.—**Operating the Tractor Plough.**—REED, C. O., in *Farm Implement News*, Vol. 42, No. 5, pp. 46-49. Chicago, February 3, 1921.

757.—**Milk-Weighing Balance.**—GOUDOT, G., in the *Journal d'Agriculture pratique*, Year 85, Vol. 1, No. 19, pp. 379-380. Paris, May 14, 1921.

766.—**Freezing Broken Eggs.**—I. MONVOISIN, A., in the *Revue general du Froid et des Industries Frigorifiques*, Year I, Vol. 1, No. 12, pp. 397-398. Paris, December, 1920.

789.—**The Degree to Which Plants Can be Considered as Integral Factors Capable of Measuring the Complex Effect of Climatic Factors.**—I. LIVINGSTONE, P. A., in *Physiological Researches*, Vol. No. 5, pp. 247-288, 1914.—II. LIVINGSTONE, B.E., *Ibid.*, Vol. I, No. 8, pp. 399-420, 1916.—III. HILDEBRAND, F. M., *Ibid.*, Vol. 2, pp. 341-405. Baltimore, May, 1921.

792.—**Effect of Late Spring Frosts on the Geographical Distribution of Forest Trees.** RUBNER, in the *Forstwissenschaftliches Centralblatt*, Year 42, Part 2, pp. 41-49, and Part 3, pp. 100-114. Bibliography of 32 publications. Berlin, 1921.

794.—**Physico-Chemical Investigation on the Power of Absorption of Soils and on the Way in Which Plants Absorb Nutritive Matter in the Soil.**—CASALE, L., in *Le Stazioni Sperimentali Agrarie Italiane*, Vol. LIV, Parts 1, 2, 3, pp. 65-113. Modena, 1921.

798.—**Soil Protozoa.**—CRUMP, L. M. (Rothamsted Experimental Station), 1. Numbers of Protozoa in certain Rothamsted Soils. *The Journal of Agricultural Science*, Vol. X, Part 2, pp. 182-198, bibliography of 23 works. Cambridge, April, 1920. II. CUTLER, D. W. (Rothamsted Experimental Station), A Method for Estimating the Number of Active Protozoa in the Soil. *Ibid.*, pp. 135-143.

799.—**Production of Mineral Phosphate in the United States in 1920.**—I. *Engineering and Mining Journal*, No. 22, p. 908. New York, May 28, 1921.—II. *The American Fertilizer*, Vol. LVI, No. 10, p. 54, Philadelphia, May 7, 1921.

810.—**Mass and Pure-Line Selection to Obtain Types of Noe Wheat Resistant to Brown Smut in Italy.**—MORETTINI, A., in *Le Stazioni Sperimentali Agrarie*, Vol. LIII, Part 10-11, pp. 399-413. Modena, 1920.

824.—**Researches on the Origin of the Oak.**—HAUCH, L. A., in *Det Forstilage Forsogsvoesen in Danmark*, Vol. V, Part 3, pp. 195-120. Copenhagen, 1920.

835.—**On the Belgian Draught-Horse.**—RASQUIN, M., in the *Journal de la Societe Nationale des Agricultures de Belgique*, Year III, No. 26, pp. 201-203. Brussels, June, 1921.

845.—**The Chinchilla Rabbit.**—CASTLE, W. E., in *Science*, Vol. LIII, No. 1373, pp. 387-388. Lancaster, Pa., April, 1921.

849.—**Causes of the Greater Resistance Met With by the Plough When Drawn Mechanically in Comparison With That Met in the Case of Animal Traction.**—CASTELLI, M., in *L'Italia agricola*, Year 58, No. 4, pp. 97-100. Piacenza, April 15, 1921.

853.—**Researches Into the Returns of Swiss Agriculture During the Years 1917-1918 and 1919-1920.**—LAUR, E., Director of the Secretariat, ZAUGG, F., Chief of Division, and NATER, H., Assistant, in the *Landwirtschaftliches Jahrbuch der Schweiz*, Year 35, No. 1, pp. 91-173. Lucerne, 1921 (20 pages in the Institute Bulletin).

857.—**The Cold-Storage of Fruit.**—MONVOISIN, A., in the *Revue general du Froid et des Industries frigorifiques*, Year II, Vol. II, No. 3, pp. 80-85. Paris, March, 1921.

869.—**Thelephora Terrestris T. Fimbriata and T. Caryophlea Basidiomyceles Injurious to Forest-Tree Seedlings in the United States.**—WEIR, R. A., in *Phytopathology*, Vol. XI, No. 3, pp. 141-144. Lancaster, Pa., March, 1921.

873.—**Tipula Simplex and T. Quaylii Diptera Injuring Pastures and Grain and Lucerne Fields in California.**—PACKARD, C. M., and THOMPSON, B. G., in *United States Department of Agriculture, Department Circular* No. 172, 8 pp. Washington, D.C., May, 1921.

THE INTERNATIONAL REVIEW OF AGRICULTURAL ECONOMICS

The following is a brief indication of the contents of the more important articles in the January-February number of the Institute Bulletin. Persons interested in any of the articles may obtain the original Bulletin on application to the Institute Branch, Department of Agriculture, so long as the supply for distribution is not exhausted.

Agricultural Association and Co-operation in Tunis.—25 pages. In accordance with its rapid economic development, the Regency of Tunis has not been behind in taking its part in the movement for association and co-operation which is more and more affecting agriculturists of all countries. At the present time, the most diverse forms of agricultural associations may be observed. Although the population of the Regency is made up of very distinct racial groups, these associations are, to a large extent, open to all, whether Europeans or natives. The Northern Chamber of Agriculture, and the Central and Southern Joint Chambers of Agriculture and Commerce are, however, confined to French citizens, and on the other hand three types of association are for natives only; the Consultative Chamber for Native Agricultural Interests of Northern Tunis, the native thrift societies, and the Co-operative Society of Native Horticulturists at Gabes.

A complete account of agricultural association in Tunis is given in the article under the following heads:

1. Organizations representing or studying agricultural interests.
2. Co-operative associations for production, purchase and sale.
3. Credit organizations.
4. Mutual insurance societies.

The Co-operative Abattoir of Catarane, France.—4 pages. An account of the organization and work of an abattoir installed on completely modern lines, and run on co-operative principles.

The Development of Agricultural Credit in Italy During the War.—25 pages. The provision of agricultural credit was one of the problems to which the Italian legislature devoted most attention during the war. The necessity at first of overcoming difficulties in regard to credit which arose as a result of the general monetary crisis and subsequently the need of increasing agricultural production, and in particular the production of food stuffs, in order to ensure the food supply of the country, compelled the Government to develop agricultural credit as much as possible.

The article begins with a description of the organization of agricultural credit in Italy as it existed at the outbreak of the war, then takes up the development during the war under the following heads:

1. Measures for strengthening the security for loans, in favour of the lending institutions;

2. Measures for authorizing new institutions to carry on agricultural credit operations;

3. Measures for simplifying the rules for the granting of loans, and for giving special authorizations and fiscal and legal privileges to credit institutions;

4. Measures for reorganizing the special agricultural credit institutions, so as to render their action more intensive and more effective;

5. Measures for increasing the capital of the principal agricultural credit institutions and for making special allocations of State funds.

The Maintenance of the Supply of Agricultural Labour in England and Wales During the War—21 pages. The first instalment of a comprehensive article on the subject. This instalment deals with the question of the agricultural labourer and military service.

Other articles in the January-February number are: Agricultural Co-operation in Ireland in 1919-20; Agricultural Co-operation in Scotland in 1920; Organization and Development of "Federazione Italiana Dei Consorzi Agrari;" The Organization and First Results of the Bank of Labour and Co-operation of Italy; The Development of Co-operation in Lithuania; Agricultural Co-operation in Minnesota; The Co-operative Sale of Alfalfa Hay in Oregon; A Co-operative Society for the Sale of Ducklings in Oregon; The Norwegian Society for Mutual Insurance Against Forest Fires; Live Stock Insurance in Switzerland in 1919; Hail Insurance in Switzerland in 1919; The Folk High Schools in Denmark; Amendments to the Law on The Re-Establishment of Small Peasant Holdings in Austria; An Official Experiment in Home Colonization in France; Number, Extent and Method of Farming Agricultural Land in Sweden.

AGRICULTURAL STATISTICS

THE CROPS OF 1922 AND THE WORLD'S WHEAT PROPECTS FOR 1922-23.

By T. K. Doherty and T. F. Astle.

The following analysis of the crop situation is based on data received up to June 20th. Tables are given showing the areas sown to wheat, rye, barley and oats in the countries from which reports have been received. These are followed by two tables giving the imports and exports (partly estimated) of wheat during the grain year 1921-22, and estimated imports for the coming grain year 1922-23. Detailed analyses of the situation in some important countries follow, and notes are added giving the crop conditions in a number of countries.

Just before going to press a cablegram was received from the Institute, in which it was reported that crop conditions in June were good in Bulgaria and Jugo-Slavia, average in England, France, Italy and Japan, poor in Austria, Czecho-Slovakia, Germany, Hungary, Netherlands and Poland, and very poor in Algeria and Tunis.

Areas sown to Cereals

WHEAT

Countries	1922	1921	Average 1916 to 1920
	Acres	Acres	Acres
Belgium	337,000	306,000	271,000
Bulgaria	1,928,000	2,281,000	2,128,000
Spain	9,922,000	10,229,000	10,270,000
Finland	20,000	20,000	19,000
France	11,860,000	12,671,000	11,078,000
Scotland	67,000	62,000	74,000
Italy	11,491,000	11,779,000	10,981,000
Jugo-Slavia	3,383,000	3,951,000(*b*)	
Luxemburg	29,000	27,000	26,000
Poland	2,434,000	1,968,000	
Roumania (*a*)	5,816,000	6,149,000	
Czecho-Slovakia (*a*)	1,527,000	1,538,000	1,573,000
Total, Europe	48,814,000	50,981,000	
Canada (*a*)	22,464,000	23,261,000	16,968,000
United States (*a*)	56,770,000	62,408,000	58,685,000
India	28,664,000	25,087,000	29,510,000
Algeria	3,034,000	2,816,000	3,134,000
Tunis	1,285,000	1,500,000	1,457,000
Total, all Countries	161,031,000	166,053,000	

(*a*) Including spring wheat.
(*b*) 1920; no report for 1921.

RYE

Countries	1922	1921	Average 1916 to 1920
	Acres	Acres	Acres
Belgium	543,000	559,000	441,000
Bulgaria	483,000	488,000	433,000
Spain	1,737,000	1,810,000	1,815,000
Finland	613,000	606,000	592,000
France	2,056,000	2,160,000	2,021,000
Italy	284,000	287,000	278,000
Luxemburg	21,000	20,000	20,000
Poland	10,940,000	8,837,000	
Roumania	481,000	656,000	655,000
Czecho-Slovakia	2,160,000	2,183,000	2,238,000
Canada	2,080,000	1,842,000	463,000
United States	5,148,000	4,228,000	4,927,000
Totals	26,546,000	23,676,000	

Winter rye, except for Canada and the United States.

BARLEY

Countries	1922	1921	Average 1916 to 1920
	Acres	Acres	Acres
Belgium	81,000	77,000	76,000
Bulgaria	363,000	414,000	429,000
Spain	3,527,000	3,562,000	4,135,000
France	356,000	385,000	310,000
Italy	544,000	541,000	503,000
Luxemburg	5,000	5,000	6,000
Roumania	259,000	162,000	104,000
Czecho-Slovakia	1,686,000	1,583,000	1,717,000
Canada	2,747,000	2,796,000	2,509,000
United States	7,550,000	7,240,000	8,150,000
Algeria	2,784,000	2,508,000	2,829,000
Tunis	1,063,000	1,230,000	1,175,000
Totals	20,965,000	20,503,000	

Winter barley only, except for Canada and the United States.

OATS

Countries	1922	1921	Average 1916 to 1920
	Acres	Acres	Acres
Bulgaria	15,000	11,000	13,000
Spain	804,000	821,000	
France	1,737,000	1,908,000	
Italy	1,186,000	1,199,000	1,143,000
Luxemburg	64,000	62,000	62,000
Czecho-Slovakia	2,031,000	2,003,000	1,981,000
Canada	16,934,000	16,949,000	13,980,000
United States	41,822,000	44,826,000	42,456,000
Algeria	596,000	558,000	587,000
Tunis	136,000	165,000	153,000
Totals	65,325,000	68,502,000	

Winter oats only, except for Canada and the United States.

IMPORTS OF WHEAT AND FLOUR

Countries	August 1st to July 31st, 1920-21	August 1st to July 31st, 1921-22, partly estimated	August 1st to July 31st, 1922-23, based on present indications of yield
	Bushels	Bushels	Bushels
Great Britain and Ireland	208,800,000	220,000,000	225,000,000
France	68,000,000	35,000,000	50,000,000
Belgium	33,600,000	48,000,000	50,000,000
Holland	20,800,000	18,000,000	20,000,000
Germany	61,600,000	60,000,000	70,000,000
Italy	98,400,000	90,000,000	100,000,000
Spain	16,000,000	8,000,000	8,000,000
Portugal	2,400,000	4,000,000	4,000,000
Greece	9,600,000	16,000,000	16,000,000
Denmark	400,000	5,000,000	5,000,000
Sweden	6,800,000	5,000,000	6,000,000
Norway	4,000,000	7,000,000	7,000,000
Switzerland	13,600,000	16,000,000	18,000,000
Austria	16,000,000	20,000,000	20,000,000
Finland	2,400,000	2,500,000	3,000,000
Poland	1,200,000	2,500,000	
Czecho-Slovakia	19,200,000	15,000,000	18,000,000
Totals, Europe	582,800,000	572,000,000	620,000,000
Ex Europe	56,000,000	100,000,000	90,000,000
Russia		20,000,000	20,000,000
Grand Totals	638,800,000	692,000,000	730,000,000

MONTHLY EXPORTS OF WHEAT AND FLOUR

(Flour reduced to wheat)

1921–22

Months	Canada	United States	India	Australia	Argentina	Totals, five Countries
1921-22	Bushels	Bushels	Bushels	Bushels	Bushels	Bushels
August	6,013,000	66,963,000	220,000	5,304,000	1,983,000	80,263,000
September	8,770,000	38,950,000	imports 229,000	5,293,000	1,289,000	54,302,000
October	24,097,000	25,366,000	imports 571,000	10,056,000	954,000	60,473,000
November	33,106,000	19,453,000	imports 2,739,000	9,991,000	637,000	63,187,000
December	37,856,000	15,014,000	imports 4,427,000	7,859,000	3,040,000	68,769,000
January	8,946,000	14,982,000	imports 3,586,000	13,644,000	10,024,000	47,596,000
February	8,595,000	10,991,000	imports 3,214,000	14,570,000	20,364,000	54,520,000
March	10,481,000	14,370,000		12,624,000	20,620,000	58,095,000
April	4,045,000	10,244,000		10,544,000	17,761,000	42,594,000
May	16,985,000	10,000,000		13,440,000	13,504,000	53,929,000
June	15,000,000	10,000,000		12,500,000	12,500,000	50,000,000
July	15,000,000	15,000,000		12,500,000	12,500,000	55,000,000
Total for Grain Year	188,894,000	251,333,000		128,325,000	115,176,000	683,728,000

The figures for April, May and June for the United States, and for May and June for other countries are estimates. India is not included in the totals.

DETAILED ANALYSES OF THE SITUATION IN EXPORTING COUNTRIES

Canada.—In the following analysis of the distribution of the Canadian wheat crop the figures compiled by the Dominion Bureau of Statistics are used, except that the grain year in our case (Institute grain year) begins on the 1st of August, 1921 and ends on the 31st of July, 1922.

Production, 1921 crop, less loss of 9,026,000 bushels for cleaning		291,832,000
Carry-over Aug. 1st (which includes for the Canadian Year ending Aug. 31st, exports of 6,013,000 bushels)		13,869,000
Total amount available for distribution		305,701,000
Actual Exports, August-May	158,894,000	
Plus estimated exports for June and July	30,000,000	
		188,894,000
Balance		116,807,000
Deduct for food	45,000,000	
" seed	43,123,000	
		88,123,000
Apparent undistributed surplus, Aug. 1st, 1922		28,684,000
Deduct quantity inspected and found unmerchantable		12,034,000
Merchantable surplus, August 1st, 1922		16,650,000

This is the merchantable surplus at the close of the Institute Grain Year. The results, if shown for the Canadian grain year beginning September 1st, 1921, and ending August 31st, 1922, would exhibit the following differences:

September 1st, carry-over (deducting August exports of 6,013,000)		7,856,000
1921 crop after deducting 9,026,000 for cleaning		291,832,000
Total		299,688,000
Actual exports, September-May	152,881,000	
Estimated exports, June-August at 15,000,000 bushels per month	45,000,000	
		197,881,000
Total balance		101,807,000
Deduct for food and seed		88,123,000
Gross surplus, September 1st, 1922		13,684,000
Deduct for grain inspected and found unmerchantable		12,034,000
Merchantable surplus, September 1st		1,650,000

United States

Carry-over, August 1st, 1921 (less exports for July, 30,413,000)		41,667,000
1921 Crop		794,893,000
Total for distribution		836,560,000
Exports, August-April	216,333,000	
Estimated exports, May, June and July	35,000,000	
		251,333,000
Balance		585,227,000
Food	489,000,000	
Seed	95,000,000	
		584,000,000
Carry-over, August 1st, 1922		1,227,000

The United States grain year really begins, however, on the first of July; hence, in order to show the distribution of the new crop without having it mixed with the old, the July 1922 exports of 30,413,000 have to be added to the carry over of 1,227,000 shown above, as follows:

Total carry-over July 1st, 1921		72,080,000
1921 Crop		794,893,000
Total for distribution		866,973,000
Food and seed (Mr. Tanner's calculation)		584,000,000
Balance		282,973,000
Actual exports July-April	246,746,000	
Estimated exports for May and June	20,000,000	
		266,746,000
Surplus, July 1st, 1922		16,227,000

If 3 per cent were deducted from the crop for cleaning, which would represent 23,846,000 bushels, there would be an actual deficit instead of the above surplus. As is the case for Canada, there is no deduction made for unmerchantable wheat of which, it appears, there was a large proportion, especially in the Northwestern States. It may be assumed that this wheat went into consumption and is included in that used for human food. No allowance is made for feed. The allowance for food given by Mr. Tanner, and which seems to be pretty generally accepted was, during the normal years preceding the war, much exceeded, even with a considerably smaller population. It does, therefore, seem evident that the carry-over from the previous year, on July 1st, 1921, was underestimated, as well as the crop production itself; otherwise such large exports of merchantable wheat would not have been possible.

Australia

Carry-over August 1st, 1921		40,000,000
New crop, 1921-22		131,818,000
Total for Institute Grain Year		171,818,000
Exports, 1921, August-December	38,503,000	
Exports, 1922, January-May	64,822,000	
Estimated exports June and July, 1922	25,000,000	
	128,325,000	
Food and seed for 1922	40,000,000	
		168,325,000
Surplus, August, 1922		3,493,000

Broomhall, April 11th, states: "It will certainly make the position of buyers more secure if Russia could produce a full crop, but so long as Australia can export 96,000,000 bushels annually, instead of 40,000,000 pre-war, and Canada 200,000,000 bushels instead of 96,000,000, the Russian loss is made good by extra production in the British Empire, and we may rejoice that such is the case for, in this matter, blood is certainly thicker than water."

Argentina

1921 Carry-over, August 1st, 1921		44,000,000
1922 New crop		154,000,000
Total for distribution, 1922		198,000,000
1921 Exports, August-December	7,903,000	
1922 Exports, Jan.-May	82,273,000	
1922 Exports, June and July (estimated)	25,000,000	
		115,176,000
Balance		82,824,000
1922, Seed and food		70,000,000
Estimated surplus, August 1st, 1922		12,824,000

It is reported on good authority that Germany is negotiating for a loan of about 25,000,000 pounds sterling with the Argentine Government, with the object of buying grain, subject to Germany agreeing to spend half the sum on meat and other products and the other moiety on grain (all in Argentina), we understand the loan is likely to be granted.

The situation is summed up in the preceding statements from which it appears, that European supplies are sufficient to last until the new crop is available, and which is expected to be from fifteen to twenty days late. This would have the effect of abnormally lengthening the demand for the old supplies and should stimulate purchases up to the very close of the current grain year.

A rough forecast for the coming grain year is also shown in the foregoing export and import tables and analysis. The acreage in Europe, so far as data are reported, is 2,167,000 acres less than last year for wheat and about 2,000,000 acres more for rye, the increase in rye being credited almost wholly to Poland. The smaller acreage in wheat will probably account for a deficiency of some 60 odd million bushels of wheat, which may be met in part by the importation of Polish rye if transportation facilities are available. The conditions of the wheat crop, however, as indicated in the notes which appear hereunder, are such that most of the authorities estimate a reduction varying from ten to fifteen per cent in yield. These conditions apply to all the important northern, central and western portions of Europe. The countries surrounding the Mediterranean have been more or less affected by drought; hence it is reasonable to expect, except for Poland, a reduction of 10 per cent in the wheat and rye crops of

Europe as compared with last year's. This would represent a reduction of about 100 million bushels of wheat, which would have to be made up in great part by additional imports.

Supplies will, as usual, come chiefly from the following countries, for which are made rough estimates of production, official figures being available for the United States only.

	Production		Estimated Exports
	1921	1922	1922-23
	million bushels	million bushels	million bushels
United States	795	855	275
Canada	300	350	225
Argentina	165	170	90
Australia	132	130	80
Roumania	75	75	30
Totals	1,467	1,580	700

The difference indicates an increase of 113 million bushels, which will about compensate for the additional European deficiency resulting from unfavourable weather. These exporting countries, including even Argentina and Australia, will have very little carry-over from August 1st next and start the new grain year with little or no surplus.

India may become an important factor during the coming year, as it reaped in March and April a crop which in ordinary circumstances would permit of an export of as much as 40 million bushels of wheat. This figure, however, will probably not be reached. Indeed, India, through last year's short crop, has just emerged from a serious famine and had to import up to February last for urgent needs no less than 16 million bushels of wheat. It will have to reconstitute its stocks for a margin of safety, and this becomes all the more imperative because of the fact that the monsoon rains have recently fallen earlier than usual, a circumstance which is considered decidedly unpropitious for its coming year. Hence, Mr. Broomhall believes that Indian authorities will be slow in lifting the export ban until there is a reasonable prospect for another good crop. This is a factor of the greatest importance, because, if India should be entirely out of the market, the other exporting countries cannot more than meet the world's requirements and will not in any event have their usual carry-over.

Consequently, the exporters can reasonably expect a steady demand at fair prices for their abundant crops. With the amount afloat for Europe and for British port stocks in mid-June about 30 million bushels less than last year, and the surplus in the Southern Hemisphere already pretty nearly cleaned up, the market will remain almost exclusively to North America until the new southern harvests become available in February next. It is well to remember in this connection that, if the official figures are to be relied upon, the United States does not start the new season with anything like the 72 million surplus it had on the same date last year. Even if the present fair promise of an abundant crop is finally realized, there will not be for distribution a total amount larger than on the first of July a year ago.

FOREIGN CROP CONDITIONS

In Europe generally the condition of the wheat crop was not very favourable in mid-June, except in the United Kingdom and in the Balkan States. There was a reduction in the acreage sown in most countries (as shown above).

There has been a long serious drought in North Africa, particularly in Algeria, where the damage to crops has been very serious. Recent rains have improved the situation somewhat. In the forthcoming grain year most of North Africa will have to pass from the roll of exporter to that of importer.

The harvest in Europe is expected to be from fifteen to twenty days late; the demand on the old crop supplies will, in consequence be unduly lengthened and should stimulate purchases of foreign wheat.

Alfred P. Dennis, special representative of the United States Department of Commerce at Rome, reported, June 5th, that:

"In the past three weeks the warm weather and sunshine have had a beneficial effect upon European field crops, the growth of which had been seriously retarded by the cold, wet spring. The farmers south of the Alps are now complaining of the excessive heat, but the wheat crop in Italy, Greece, and North Africa is matured beyond the point of drought injury. More seasonable conditions will not compensate for earlier losses in acreage and condition of winter cereals. An important Paris farm paper places the coming French wheat harvest 72,000,000 bushels below that of last year. Latest reports from Germany show no prospect of increased cereal yield, with fears expressed as to an inevitable food shortage next winter. It may now be accepted that

Germany, France, Great Britain and Italy, with a combined population exceeding that of the rest of Europe (excluding Russia) will each have to import more grain during the coming cereal year than was the case this season.

Russia.—Mr. Broomhall's correspondent at Bucharest, Roumania, May 25th, 1922, writes the following:—

"You ask me, when in my opinion, Russia is again likely to become an exporter of wheat. I hesitate to venture an opinion, but fear it will not be before some years. The reports I have recently had of the state of affairs in the South is so bad as to defy description. People are dying in thousands of actual starvation, as well as of typhus and cholera, and my last letters advised me that our Odessa manager and one other clerk had died of the diseases mentioned. Before anything else can be done in Russia, steps will have to be taken to stamp out disease and to restore decent sanitary conditions, and then there will be the problem of internal transport to tackle. I see in this country the result of the land passing out of the hands of the big proprietors (who cultivated same on more or less modern lines) into those of the peasantry and expect that in the case of Russia also, even when conditions begin to become normal again, production will not be on the same scale as in pre-war days for many years. An old Odessa exporter recently expressed the opinion that Russia will not have any grain to export for at least three or four years."

The opinion of this correspondent is shared by the British commissioner for famine relief in Russia in his report after his recent return from Russia. He estimates that only 35 per cent of the pre-war area devoted to winter cereals was sown last autumn. With regard to the spring wheat prospects,he says that the seed brought by the railways arrived too late, and owing to the thaw, could not be moved into the interior. Owing to the hopeless transport conditions, it is estimated that not more than 33 per cent of the required quantity of seed will ever reach the fields. This seed consists mostly of oats.

The Canadian Commissioner, Department of Trade and Commerce, at Milan, Italy reports that:

"Russia will not be in a postion to export grain for at least five years. This report emphasizes the fact that under the best of pre-war conditions, especially during the period of 1909 to 1913, when the aggregate yields of wheat and rye were very good, the exports of these crops taken together did not exceed 10 per cent of their yields. In other words, approximately 90 per cent of the total quantity of wheat and rye produced in Russia was required for home consumption."

"The occupation of the large estates by the peasants and the grain requisitioning policy that followed is said to have resulted in a considerable reduction in the area devoted to the various crops. It has been conservatively estimated that it will require at least three years to restore livestock and farm equipment to pre-war conditions. It should, however, be remembered that before Russia can be in a position to export any considerable quantities of wheat and rye, a surplus over and above the country's food and seed requirements will have first to be produced and accumulated."

United Kingdom.—The weather was favourable in May, especially during the last half of the month. Spring sowings were late. The condition of winter wheat on June 1st was very good.

France.—In April cold rainy weather had been experienced, and estimates of the acreage that growers have had to replough vary from 15 per cent to 18 per cent in the North and East, and from 12 per cent to 15 per cent in the West and Centre. The winter crop was growing best in the South, where lowest percentage of winter killed was reported.

Crops made slow growth in the first part of May and their condition was below average, but they improved somewhat during the second half of the month. In the North, where the most important wheat areas are situated, there was lack of moisture, abnormal weed growth, and insect ravages. The area sown to winter wheat is nearly 1,000,000 acres less than last year. May condition was 58 per cent compared with 74 per cent the previous year.

Belgium and Denmark.—In these countries cereal crops suffered from the cold in April. Weather conditions improved in May, and winter wheat condition was reported as average. Spring seedings made good progress.

Germany.—On April 8th, 1922, a decree permitting unrestricted importation of wheat and rye flour until further notice was issued by the German Federal Ministry of Nutrition. As soon as the announcement was made the domestic prices dropped considerably. There has been some barter of rye flour for wheat at 130 tons of rye for 100 tons of wheat.

In the first part of May, the weather was very unfavourable and the condition of winter cereals was poor. There was considerable injury from frost. Fine weather was experienced in the last week of May and there was a small improvement in the condition of the crops.

Austria.—Early in May winter crops were reported to be backward and patchy. Later, rains benefited the crops, and on June 1st they were reported as average.

Czecho-Slovakia.—Unfavourable growing conditions were reported in the early spring.

Hungary.—Early in May, crops were reported as delayed and growth several weeks behind time. Winter cereals were medium and spring cereals between medium and good.

Italy.—The wheat crop was doing well at the end of May, but the damage done to the plant during the previous unfavourable weather had not been made good. The International Institute reported conditions as average on June 1st. The winter wheat acreage is slightly less than last year.

Spain.—There was rough, stormy weather in the first part of May, but conditions improved later. Growth was backward.

The import duty on wheat has been advanced from 46 cents to 65 cents per bushel. This duty is levied on wheat coming from countries with commercial treaties, but for countries which have no commercial treaties with Spain the duty is 42 pesetas per quintal ($2.20 per bushel).

Jugo-Slavia.—Rains were plentiful and conditions generally satisfactory in May. The condition of crops was reported as average on June 1st.

Bulgaria.—Winter wheat was in good condition and spring seeding progressed favourably. There is a 15 per cent decrease in the wheat acreage from that of last year.

Roumania.—Broomhall's Bucharest correspondent reported, April 23rd, that:

In order to improve the export trade the new Government has set up a "Higher Economic Council," which will take the place of the "Sindex" Society, now in liquidation. The Council comprises the Ministries of Agriculture and Domains, of Industry and of the Interior; the Directors of the Railway companies and of the co-operative societies have also been appointed. At the present moment the Council is working actively for the increase of production and an improved export trade. It is very desirable that the value of the lei should improve without further delay, as foreign creditors are pressing for payment. Certain Roumanian merchants and manufacturers have become rather alarmed at the action taken by their creditors abroad, and have sent a delegation to the Government explaining their difficulties. The Government proposes to obtain further delay by giving foreign creditors a State guarantee of payment, as the economic situation of Roumania is slowly but surely improving.

Excellent weather conditions continued during May and very favourable reports of the crops were received. There is a slight decrease in the wheat acreage.

India.—The wheat crop was harvested under favourable conditions. The first estimate of the crop is 355,000,000 bushels, compared with 253,000,000 last year, and 340,000,000 bushels, the average of the five previous years. A later revision raises the new crop to 365,000,000 bushels.

Australia.—Seeding was proceeding under favourable conditions, and an average acreage was expected.

Argentina.—Weather conditions were favourable for the preparation of the soil and the seeding of the new crop.

Mr. Broomhall believes the official estimates are somewhat low, and that on May 1st there was still a surplus of 36,000,000 bushels for export.

UNITED STATES JUNE CROP REPORT

Estimated acreage and production of crops in the United States according to the report of the Department of Agriculture issued on June 8th. The figures show that crops made great gains during May. The final estimates for 1921 are given for comparison.

Crops	Area		Production	
	1922	1921	1922	1921
	Acres	Acres	Bushels	Bushels
Wheat	56,770,000	62,408,000	855,000,000	795,000,000
Oats	41,882,000	44,826,000	1,305,000,000	1,061,000,000
Barley	7,550,000	7,240,000	191,000,000	151,000,000
Rye	5,148,000	4,228,000	81,000,000	58,000,000
			Tons	Tons
Hay	74,345,000	74,225,000	106,000,000	97,000,000
			Bushels	Bushels
Apples			180,000,000	97,000,000
Peaches			54,000,000	33,000,000

CANADIAN JUNE CROP REPORT

Preliminary estimate of areas sown to wheat, rye, barley, oats and potatoes, with condition as on June 1, 1922.

Crop	Areas sown 1922	Compared with 1921	Condition (100=average 1912-21)
	acres	p.c.	p.c.
Fall wheat	757,400	105	95
Spring wheat	21,706,600	96	101
All wheat	22,464,000	97	101
Rye	2,079,600	113	102
Barley	2,747,000	98	99
Oats	16,933,500	100	101
Potatoes	703,600	100	—

INDIA'S RICE CROP

(From U.S. "Weather, Crops, and Markets," May 27, 1922.)

All restrictions on the exportation of rice from India have been removed, the proclamation of the Government of India announcing the removal of such restrictions having gone into effect on April 1.

Restrictions on the exportation of rice were imposed more than three years ago because of the poor crops in India and high prices of rice as well as other foodstuffs. However, the prospects are good for normal wheat and rice crops in India this year, and this led to the removal of the rice export restrictions. Before the period of poor crops in India it was customary for that country to export its superior or special qualities of rice, counterbalancing such exports by importing comparatively cheap grades of rice from Burma.

The 1921-22 rice harvest in India was very good, amounting to 73,906,560,000 lbs. of cleaned rice, compared with 62,792,920,000 lbs, on 1920-21; 71,612,800,000 lbs. in 1919-20, and 55,218,240,000 lbs. in 1918-19. The average rice crop during the 5-year period of 1909-13 amounted to 75,584,500,000 lbs. The wheat crop, which during the 5-year period of 1909-13 averaged 350,736,000 bushels, amounted to 250,469,000 bushels in 1921. The average annual wheat exports during this pre-war period were 51,510,000 bushels. The 1922 wheat crop is officially estimated at 365,235,000 bushels, which is 4·1 per cent above the 5-year (1909-1913) average.

India is the largest rice-producing country in the world, the average annual pre-war (1909-13) crop amounting to 75,584,500,000 lbs. from an average acreage of 73,089,000 acres. The world production of rice during the same period, so far as statistics are available, averaged 110,780,000,000 lbs. annually. It thus appears that India produces more than 68 per cent of the world's rice. The rice crop of the United States during this period averaged 681,166,000 lbs. annually.

The consumption of rice in India during the 5-year pre-war period averaged 67,890,542,000 lbs. annually, and the average annual exports (mostly cleaned rice) amounted to 5,337,516,000 lbs. The chief importers of India rice are the United Kingdom, Germany, Ceylon, Java, Netherlands, Arabia, Turkey, the Straits Settlements, and Egypt.

Prominent rice dealers in Calcutta have stated that the removal of the export restrictions on rice will result in large shipments to Europe and America, thus in all probability enhancing the price of both Bengal and Burma rice.

LIVE STOCK STATISTICS

SWITZERLAND

Classification	Numbers on		Increase(+) or decrease(−)	
	April, 21, 1921	April 21, 1920	in number	per cent
Horses	133,847	129,769	+ 4,078	+ 3·1
Cattle	1,424,856	1,382,116	+42,740	+ 3·1
Swine	638,761	546,122	+92,632	+17·0
Sheep	244,435	240,553	+ 3,882	+ 1·6
Goats	329,192	333,852	− 4,660	− 1·4

NETHERLANDS

Classification	Numbers on		Increase(+) or decrease(−	
	May, 1921	May, 1910	in number	per cent
Horses	363,668	327,377	+ 36,291	+11·1
Cattle	2,062,771	2,026,943	+ 35,828	+ 1·8
Sheep	668,211	889,036	−220,825	−24·8
Swine	1,519,245	1,259,844	+259,401	+20·6
Goats	272,298	224,231	+ 48,067	+21·4
Poultry	9,660,799	9,777,962	−117,163	− 1·2
Beehives	93,637	69,406	+ 24,231	+34·6

AN INVESTMENT that Increases in Value the longer it is Held.

AN INVESTMENT you can Realize upon immediately, without loss.

AN INVESTMENT that will yield 5½% Interest, compounded half-yearly.

AN INVESTMENT that is backed by All the Resources of Canada.

is offered you in

Dominion of Canada Savings Certificates

Denominations to suit every Investor

$5 $10 $25 $50 $100

Obtainable at the following Prices:

$4.25 $8.50 $21.25 $42.50 $85.00

at any Bank or Money Order Post Office

"INVEST TO-DAY!" "SAVE BEFORE YOU SPEND !!"

Issued by . . . . . The Finance Department, Ottawa

Directory of the Department of Agriculture

Minister.....The Honourable W. R. Motherwell.

Deputy Minister.....J. H. Grisdale, B. Agr., D.A.Sc.

Commissioner, Dept. of Agriculture.....Duncan Marshall.

Assistant Deputy Minister and Secretary....Lt.-Col. A. L. F. Jarvis, I.S.O.

The Dominion Experimental Farms, Director, E. S. Archibald, B.A., B.S.A.

Functions—To administer the Central Experimental Farm at Ottawa, twenty-one branch farms, eight sub-stations, eighty-six illustration stations, and two tobacco stations. The divisions of work are: Administrative, Chemistry, Horticulture, Cereals, Poultry, Animal Husbandry, Forage Plants, Bee, Tobacco, Botany, Field Husbandry, Flax, Illustration Stations, and Extension and Publicity.

Health of Animals Branch.....Veterinary Director General, Frederick Torrance, B.A.,D.V.S.

Functions—To administer enactments for the protection of live stock from contagious diseases, and to inspect meats, meat products and canned foods; to conduct research work.

Live Stock Branch.....Commissioner, H.S. Arkell, M.A., B.S.A.

Functions—To develop the live stock industry through the use of superior stock; to improve marketing facilities.

Dairy and Cold Storage Branch.....Commissioner, J. A. Ruddick.

Functions—To develop the dairy industry; to inspect public cold storage warehouses; to carry on shipping experiments; to administer Dairy enactments.

Seed Branch.....Commissioner, George H. Clark, B.S.A.

Functions—To encourage the production and use of pure seed; to test and inspect seed; to inspect feed manufacturing plants; to supply seed in case of shortage.

Entomological Branch.....Dominion Entomologist, Arthur Gibson, F.E.S., F.E.S.A.

Functions—To investigate injurious insects and methods of control; to enforce the Destructive Inspect and Pest Act.

Fruit Branch.....Commissioner, C. W. Baxter.

Functions—To develop the fruit industry; to enforce the Inspection and Sales Act as it relates to fruit, fruit packages and potatoes; to adjust transportation difficulties.

International Institute of Agriculture..Commissioner, T. K. Doherty, LL.B.

Functions—To represent Canada at the International Institute of Agriculture at Rome; to publish world agricultural information and statistics; to maintain the departmental library.

Agricultural Instruction Act Branch..Commissioner, (Acting), J. H. Grisdale, B. Agr., D.A. Sc.

Functions—To administer the Agricultural Instruction Act, and to report upon the work carried on by the provinces under its provisions.

Publications Branch.....Director of Publicity, J. B. Spencer, B.S.A.

Functions.—To publish "The Agricultural Gazette;" to distribute departmental publications; to prepare and issue other publicity matter.